THESIS

for the

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by

Langworthy Laurie

M. B., B. Ch.,

Edin.

I N F L U E N Z A.

PROLOGUE.

Prior to 1889 there had not been a serious epidemic of influenza for over forty years; the result was that in that year the majority of medical practitioners had no practical knowledge of the clinical aspects of the disease, and what was known as influenza was really a feverish catarrh, or common cold in the head.

Since the pandemic of 1889-90, the disease has practically always been present, occasionally breaking out into epidemic form in the colder months of the year; so that, in general practice, many cases are met with, and one has every opportunity of studying the various aspects of the disease; although it is no doubt true that many of the attacks which are now in a loose way diagnosed as influenza, are something else.

Influenza is, however, a disease in which the symptoms are so varying, and the complications so numerous and so grave, that a thorough understanding of the subject is very necessary.

HISTORY.

The opinions of the historians as to the date of the first epidemic of influenza are divided. Haeser and others consider that the description of a pestilential disease given in Livy (Lib.IV,cap.52.) refers to an epidemic of influenza in the year 412 B.C.; Möst (Influenza, or the greatest epidemic of disease of recent times, Hamburg, 1820.) mentions that influenza was described by Hippocrates. Leupold (Geschichte der Medicin, Berlin, 1863.) and Thomas Glass (Thompson's "Annals of Influenza") regard the report of Diodorous of a pestilence occurring 395 B.C., as having been one of influenza. The fact of the mortality from this disease among the Grecian army at the siege of Syracuse having been extremely high is, however, against this theory. According to Hirsch, the first epidemic of the disease occurred in 1173, but this point has been disputed, as will be seen from the following tabulation:

Year of first Epidemic.	Author.
1173.....	Hirsch
1293.....	Zeviani

1323.....Gluge
Schweich
1387.....Biermer
Ripperger
Saillant
Thompson
1510..... Zuelzer
Leichtenstern

1510.- In this epidemic the disease spread all over Europe. Short (Thompson's "Annals of Infl.") says it was brought to Sicily from Malta, thence invaded Spain and Italy, and so spread all over Europe. The symptoms mentioned in the chronicles of this epidemic were fever, cough, headache, insomnia, and pains in the stomach and limbs.

1557.- In this year Europe was again invaded by the disease, which, according to Thompson's "Annals", originated in Asia. Short, writing of this epidemic, says:- "There were many catarrhs followed "by cough and fever; the fever passed off with "sweats or bleeding at the nose; in some few it "turned to pleurisy or fatal peripneumony."

1580.- This was the year of the first real pandemic. The disease commenced in the East and spread Westwards over Europe and Northern Africa. The usual symptoms were present, such as headache, cough, fever, rigors, and pains about the body. In addition, many complications are mentioned as having occurred in this pandemic - viz., otitis, parotitis, pleurisy and consumption.

1658.- Writing of the epidemic of this year, Thos.Willis, of Oxford (Annals of Influenza,pp. 11 & 12), says:- "About the end of April, suddenly a "distemper arose as if sent by some blast of the stars, "which laid hold of very many together; so that, in "some towns, in the space of a week, about a thousand "people fell ill together". The symptoms mentioned are:- severe cough, nasal catarrh, fever, anorexia, malaise, pain in the back and limbs, and occasional haemorrhage from the nose, lungs, or bowels.

1709.- Many epidemics are recorded as having occurred in the eighteenth century; the most important were those in the years 1709-12, 1729-30, 1732-33, 1742-43, 1762, 1775, 1781, 1788-90. In some of these, especially the last-mentioned, the disease was of very wide distribution. The epidemic of 1742-43 is of special interest, for then the name

"Influenza" was first applied to the disease in England.

1830-33.- During this period there were two or three pandemic outbreaks in which the disease was spread all over the world. In the first outbreak the disease appears to have originated in China and to have spread thence Eastwards, and so all over the world.

1847.- In this year another pandemic of the disease arose. The first outbreak was in Russia, and the epidemic was again of universal distribution. From this date until 1889 there was no well-marked outbreak of the disease.

NOMENCLATURE.

Most diseases have been named according either to their clinical aspects or to their pathology; but, in the case of influenza, neither of these methods are satisfactory,- for the symptoms of the disease are so numerous, and so diverse, that many different names might be applied to it, according to which symptoms were considered to be the most important.

This, indeed, is well exemplified by the Latin names:- catarrhus febrilis, catarrhus epidemicus, catarrhus a contagio, fluxio catarrhalis, tussis epidemica, febris suffocativa, under which, previous to the middle of the eighteenth century, the medical writers described influenza.

The sudden onset of the disease has given rise to several names for it, e.g., German, Blitz-Katarrh (lightning catarrh) and French, La Grippe (from "gripper", to snatch). Another symptom of the disease gave rise to the Saxon name Pose, (from "gepose", heaviness) indicating the languid state induced.

Different nations have given different names to the disease, according to the country from which it came: thus, Jewish writers called it "Kurdaikis, from its supposed origin from the Kurds; and, in like manner, it has been known as Chinese catarrh, Russian fever, etc.

Many fanciful names have been given to the disease by different nations, e.g., French, "tac", "horion", "petit courier"; English, "lightning catarrh", "sheep's cough", "gallant", and "the fashionable disease"; German, "ziep", "huhner-weh", and "modefieber".

The term "influenza" was first given to the disease in England, during the epidemic of 1743, by Pringle; but, according to Clemow (Public Health, vol.II,p.361) the name was used in Italy, as early as 1580, by Buoninsegni, who thus designated an epidemic which occurred in Florence in 1386. The word is of Italian origin and means "an influence" and points to the, in those days, supposed cause of the disease, e.g., influence of the atmosphere, influence of cold, etc.; thus, Calen (1759) makes it depend on "ab occulta quadam coeli influentia".

DEFINITION.

Influenza is a specific contagious fever of sudden onset and short duration, attended with great prostration, and associated usually with severe respiratory, or nervous, or gastro-intestinal symptoms. It is epidemic and often pandemic; and, following the pandemic, there are, for several years, endemic, epidemic, and sporadic outbreaks in different regions.

BACTERIOLOGY.

DISCOVERY OF THE SPECIFIC BACILLUS.

Prior to 1892, many unsuccessful attempts had been made by bacteriologists to find in the sputum of patients suffering from influenza a new germ, to the presence of which the disease might be attributed. In addition to the sputum attention was also directed to pleuritic effusions, meningeal pus, and other morbid fluids formed in the course of the disease. The chief bacteria found were streptococci, staphylococci, and diplococci; and the constant presence of streptococci led at least one observer to regard them as the probable exciting cause of influenza.

The researches of Canon, Kitasato, and Pfeiffer led to the discovery in 1892, of the bacillus of influenza, or Pfeiffer's bacillus as it is called.

Pfeiffer examined in particular the sputum from the bronchi of patients suffering from influenza, and was careful to obtain this fresh and immediately after its expectoration. He spread the sputum carefully in sterile glass dishes and removed from the middle the purely purulent portions. Under these conditions he found, in all recent cases, a single well-characterized species of bacillus, in almost pure culture, and in large numbers. He (Deut.med.

Woch.,1892, 2) described these bacilli as tiny rods, only twice as long as they are broad, and measuring about 0.2μ by 0.5μ ; they have rounded ends and are non-motile and non-flagellated; they are usually solitary, but may occur in small chains, and they never form spores.

STAINING.

The bacilli stain with difficulty. They stain best with Ziehl's carbol-fuchsin solution, or with Loeffler's alkaline methylene blue. The two ends of the rod take the stain better than the central part; so that, at first sight, they have the appearance of diplococci; and it was probably owing to this peculiarity in their reaction to stains that the earlier observers were misled, and confused them with diplococci and streptococci. The bacilli cannot be stained by Gram's method.

Canon obtained the bacilli direct from the blood of patients suffering from influenza, and was thus able to diagnose the condition, even when the clinical symptoms were unusual. (Deut.med.Woch., 1892,2). He found the bacillus in the blood of all patients during the feverish attack. To demonstrate them he used a special stain, Czenzynke's solution, which consists of:-

Concentrated aqueous solution of methly blue, 40c.c.
0.5% solution of eosin in 70% alcohol..... 20c.c.
Distilled water..... 40c.c.

The blood films, after fixing by immersion in absolute alcohol for five minutes, are placed in this solution and incubated for five hours; after which they are washed in water, dried, and mounted in Canada balsam. The bacilli are stained blue; they occur usually in very small numbers, and may be found enclosed in the leucocytes.

CULTIVATION.

The influenza bacillus does not grow well in artificial media. The best culture medium is agar streaked with blood, especially the blood of a pigeon; when this medium has been inoculated with the bacillus and incubated for twenty-four hours, minute colourless colonies are formed, having the appearance of dew drops; but they are so minute that they are difficult to see without the aid of a lens; a special point about them is that they never become confluent. The bacilli only grow at blood-temperature, and they are strictly aerobic.

An interesting point in the cultivation of the bacillus is the fact that they will grow without the presence of haemoglobin, and retain their

vitality longer, if certain other bacteria are present with them. Cantani first discovered this; he succeeded in obtaining cultures of the influenza bacillus upon ordinary media which were inoculated with it, together with the bacillus diphtheriae, staphylococci, and other organisms. This has also been demonstrated by Luerssen (Cent.f.Bact.,I,XXXV, p.34) and Neisser (Deut.med.Woch.,1903, 26).

In bouillon, the bacillus does not grow well; but it forms a woolly deposit at the bottom of the tube. In drinking water, they lose their vitality in from 24 to 36 hours. The power of resistance of the bacilli is very feeble; they are killed by five minutes' exposure to a temperature of 60°C., and they will not grow at any temperature below 28°C. They are extremely sensitive to drying; sputum dried at the ordinary room temperature was sterile in 36 hours. (Leichtenstern: Nothnagel's Encyclo. p.584). In moist sputum, however, they retain their vitality for a considerable period; and the disinfection of sputum from a case of influenza is as necessary for prophylaxis, therefore, as in the case of sputum from a phthisical patient.

IMMUNITY.

One attack of influenza does not protect against a second; and one constantly, therefore, meets with patients who have suffered from the disease more than once. But it is very probable that the disease does confer an immunity which is, however, of very short duration, and not to be compared with the immunity conferred by such diseases as measles or small-pox.

Some physicians believe that one attack predisposes to a second; and Gottstein considers this increased predisposition to be the explanation of the disease becoming endemic. Influenza is, however, a disease in which relapses very frequently occur; and it is very probable that what were thought to be second attacks were, in reality, relapses; and upon this error the "increased predisposition" theory is probably based.

Deline and Kole (Zeit.f.Hyg.,Bd.24, 1897) endeavoured, without success, to produce immunity in animals. They injected increasing doses of cultures into the peritoneal cavity, and found that, although the animals so treated were able to resist more than the usually fatal dose, large doses of living cultures invariably killed them. These observers found the toxicity of the culture to depend upon an intracellular toxin.

MIASMA.

Many theories have been advanced as to the origin of influenza. The extraordinary rapidity with which the disease becomes disseminated throughout countries gave rise to the idea that the pathogenic agent was a miasma which distributed itself throughout the air.

Colin, in 1889, in the Paris Academy, gave it as his opinion that:-"Grip is independent of any "kind of human intercourse; it travels through densely populated districts and uninhabited regions with "the same rapidity as light and electricity."

VOLCANIC ERUPTIONS.

Harries, in a paper on the origin of influenza epidemics read before the Royal Meteorological Society,(Feb.17th.,1892), traced the origin of the epidemic of 1890 to the eruption of the volcano of Krakatoa, in the straits of Sunda, in 1883. He calculated that it took nearly seven years for the dust then emitted to fall to the earth again, and he thought that to this dust the epidemic of influenza was due. It was, however, shown by other writers that this dust was carried round the world in under twelve days; and that, if this dust was the cause of the epidemic, the disease would have shown itself at once, and not have taken seven years to break out.

RUSSIAN ENDEMICITY.

Tessier (L'Influenza en Russie, 1891) considers that the home of influenza is on Russian soil, and that it is always smouldering there. He attributes this to the habits and mode of life of the peasants, and to the insanitary state of the country. This theory does not, however, explain why epidemics of the disease only break out at intervals, or why epidemics do not appear in other countries where the peasants live in similar circumstances.

CHINESE INUNDATIONS.

The origin of the pandemic of 1890 was traced by some to the inundations which occurred in China in 1888 and 1889, causing great destruction of animal and vegetable life; it was supposed that the decaying matter, left after the water had subsided, formed a focus of decomposition sufficient to poison the atmosphere and create an epidemic. It is, however, a known fact that the disease did not appear in China until after the arrival of the English mail-steamer at Hong Kong in January of that year, on

board of which there were several patients suffering from influenza.

INSECTS.

In the pandemic of 1782, I.Kant and his contemporaries attributed the disease to "harmful insects," brought through Russian commerce to Europe; and they were certainly a good deal nearer the truth than those who considered the disease due to a miasma spreading through the atmosphere.

CONTAGION.

The history of the epidemic of 1889-90 strongly supports the view that influenza is propagated entirely by human intercourse. The epidemic commenced at Bokhara, in central Asia, in May 1889, (Heyfelder: Wien.klin.Woch., 1890) and was spread from there by the caravans travelling Eastward, and appeared at Astrakhan in the early days of October; by the end of that month the disease was at Moscow, and, according to Drasche (Wien.med.Woch.,1890), was epidemic in St. Petersburg before November. From there it spread by train to Berlin and Paris, and by ship to foreign ports; so that, in a few months, the disease was prevalent practically throughout the world.

From Bokhara to Astrakhan, a distance of 1,600 miles, the disease took fifteen weeks to travel (the rate of the ordinary caravans); but when it reached Moscow, whence there is rail communication with the rest of Europe, it began to spread with great rapidity, but nowhere was its rapidity of distribution greater than the rapidity of the most speedy means of communication; and in this connection it is interesting to note that in the last pandemic the spread of the disease was much more rapid than in any previous one, when means of communication were less easy and less rapid,- a fact which in itself is strong evidence in favour of the contagion theory.

The direction in which the disease spreads is not a steady progress from East to West, but is determined exclusively by intercommunication; in each country it appeared first in towns, and the towns first affected were the capital or seaports or frontier towns having trade with countries already affected. Neighbouring communities have often suffered at considerable intervals of time, which could not happen if the disease originated in a miasma spread in the atmosphere.

When the disease occurred in sparsely-

populated districts, it was observed that it spread gradually in all directions from the district which was first infected, that is to say, it radiated from a common centre; but in districts in which intercommunication was more general and more rapid, the leaping character of the disease was more marked, as, for instance, in the epidemic of 1890, when London and Paris became affected much sooner than certain parts of Germany, although the disease was spreading from Russia; so that it is obvious that, whether the disease spreads in a radiating or leaping manner depends entirely upon the means of communication existing.

Wherever the disease appeared there was evidence to prove that it had been introduced by individuals coming from places where the epidemic already prevailed, and that the first cases in the new localities occurred in persons brought into intimate relations with the new arrivals; thus, persons living in the suburbs of a city in which the disease is prevalent, and going daily to business in that city, have infected members of their own households and persons employed in the suburbs.

It does, however, seem that in some cases it is not possible to trace communication between an infected area and one in which a fresh outbreak occurs; but the acceptance of the view that influenza is, as a rule, transferred by human intercourse, does not necessarily involve the assumption that the virus can be propogated outside the human body.

DOMESTIC ANIMALS.

The opinion that influenza may be conveyed by direct infection from the domestic animals, more especially the horse, found support in the prevalence of the disease, called influenza or "pink-eye", among horses in England, just prior to the epidemic of 1890. Similar observations have been made during previous epidemics, but, on the other hand, "pink-eye" has often prevailed as an epizoötic without any coincident epidemic of influenza.

Persons employed in attending on horses affected with "pink-eye" have not suffered from influenza more severely, or in greater numbers, than other members of the community; and in many places where influenza has been raging, there has been no occurrence of "pink-eye" among the horses. Under the name influenza, however, several diseases of the horse are probably included; and, although recent evidence is opposed to the view that the equine disease can be communicated to man, the question can

only be satisfactorily answered by bacteriological examination. Leichtenstern (in Northnagel's Encyclopaedia) dismisses the subject with the words: "Human influenza is a disease which is peculiar to "the human race, and, up to the present time, has "not been observed in animals."

AGE AND SEX.

Influenza attacks persons of all ages and of both sexes. Children at the breast appear to be affected in a much less degree than all other ages. The writer has attended several cases of influenza in women suckling their infants, in none of which did the child contract the disease; and this experience is borne out by other writers. Children of the school age, on the other hand, are frequently affected; but the most likely explanation of this is that the school is a great distributing-agent of all contagious diseases.

The age that shows the greatest incidence of the disease is between 20 and 40. This is probably accounted for by the fact that persons at this period of life have greater intercommunication than others, and also because they form a greater proportion of the population.

As regards sex, statistics show that a greater proportion of males are affected; but this, again, is due to their having more intercommunication than females, and not to any difference of predisposition to the disease.

OCCUPATION.

The influence of occupation upon the liability to contract the disease depends upon how much the occupation involves the worker's coming into contact with persons who are already suffering.

PERIOD OF INCUBATION

At the commencement of the pandemic of 1890, when the miasma theory of origin held sway, it was asserted that influenza had no period of incubation; it was, indeed, the suddenness with which people became affected that supported the miasma theory; but, on the discovery of the bacillus, this theory had to be rejected.

The time elapsing between the inception of the germs and the appearance of symptoms is undoubtedly very short - in the majority of cases one to three days, but observations are recorded in which the period of incubation has been even shorter than this, as little as twelve hours.

According to Parson's reports, the duration of the period of incubation may be taken, from the concordant answers of the majority of observers, to be from one to three days.

S Y M P T O M A T O L O G Y

CLINICAL COURSE

In a typical attack of influenza, a person, apparently in the best of health, is suddenly overcome by a feeling of general malaise and profound depression. He feels chilly and may have a severe rigor. There is a marked headache and pains "behind the eyes," the eyeballs themselves being tender on pressure. There are also pains about the body and limbs, and these are usually most severe in the nape of the neck, the loins, the knees and along the costal margin. Insomnia is usually present; there may be delirium. The eyes smart and water, and there is usually photophobia; occasionally intense earache is present. The weakness and feeling of lassitude become intense, and the patient is obliged to take to bed. The tongue usually remains moist, and it may be fairly clean, but more commonly it becomes covered with a thick fur; the patient complains of a bad taste in his mouth, and his breath is extremely heavy or even foetid; there is usually complete anorexia, amounting in some cases to absolute loathing of food; nausea is sometimes present, and there may be vomiting. The bowels are usually constipated, but in some cases acute diarrhoea may set in, accompanied by colic and tenesmus. In the majority of cases the toxin affects chiefly the respiratory tract, and the patient suffers greatly from coryza and pain or tightness in the chest, accompanied by a harassing cough.

At the commencement of the attack the tem-

perature suddenly rises, usually to 102°F or 103°F. The pulse rate usually corresponds with the rise in temperature, but in some cases the tachycardia is disproportionate to the amount of fever; this is especially the case in children.

Although the above description applies to many cases seen in general practice, yet the disease shows such a variety of groupings of the symptoms that different varieties of the disease are described according to the prominence of either nervous, catarrhal or gastric symptoms; besides these, the disease may occur as a simple pyrexia of short duration, and this is especially the case when young children are attacked.

VARIETIES OF INFLUENZA.

I. Purely toxic forms.

In this division may be classed:-

(a) Simple influenza fever.
(b) Nervous form of influenza.

(a) In simple influenza fever, apart from malaise, fever, and headache, the usual influenza symptoms, especially catarrhal processes, are absent.

This form of the disease was recognised by physicians in the earlier epidemics; thus, Gray writes of the epidemic of 1782,-"In some cases the catarrhal symptoms were entirely wanting, the disease being like a common fever". This form of the disease is believed to be most common in young children.

(b) The nervous form of influenza is not an uncommon variety. In this form the toxic action is especially on the cerebro-spinal system. There is very severe headache which comes on suddenly and is most violent and persistent. There are also severe pains in the back and limbs, and general nervour prostration. There may be complete loss of taste and smell, and in some cases the hearing is affected, Insomnia is usually present, and the disease may commence with delirium or even coma.

II. Toxic-Inflammatory Varieties.

In these, in addition to toxic phenomena, there are well-marked catarrhal symptoms. These varieties are two in number:-

(a) Catarrhal respiratory.
(b) Gastro-intestinal.

(a) The catarrhal respiratory variety shows, in addition to toxic symptoms, catarrh of the respiratory tract. In some cases actual catarrh is

not well marked, but there are severe congestion and irritation of the respiratory mucous membrane, which give rise to a peculiar harsh, hacking cough.

(b). The gastro-intestinal variety is less common than the other forms. It is characterized by catarrhal processes in the gastro-intestinal mucous membrane, accompanied by coated tongue, anorexia, vomiting and diarrhoea, or the so-called gastric crises, which will be considered later.

ANALYSIS OF THE SYMPTOMS.

THE FEVER.

The temperature rises rapidly with the initial chill; the rise is sudden and comes on without any warning; and within a few hours the temperature may be 103°F or 104°F. Cases are not uncommon in which the initial rise of temperature is higher than this; the writer has seen two cases in which the temperature at the onset of the disease was 106°F.

Although the temperature usually rises rapidly, yet this is not always the case, for the rise may be gradual, and the fastigium may not be reached until the second or third day after the onset of the disease.

The temperature shows no definite type, as for instance, it does in enteric fever, but is very mobile and inclined to be irregular and intermittent; in un-complicated cases it rarely lasts longer than two or three days; indeed, in some cases, it falls again to normal in less than twenty-four hours.

Should the fever be protracted, it may be high and continued, lasting several days and falling gradually, or, as is more frequently the case, it may show evening exacerbations and morning remissions.

Hyperpyrexial temperatures of 107°F-109°F occasionally occur in simple influenza, but they are more frequent when certain complications arise, especially in those cases where the disease sets in with severe cerebral symptoms - such as hemiplegia or coma.

RESPIRATORY SYSTEM.

The most numerous and important of the local inflammations due to influenza occur in the different parts of the respiratory mucous membrane, from the nose to the pulmonary alveoli. This probably depends upon the fact that the specific cause of the disease settles first on the respiratory mucous membrane, which becomes the seat of the primary lesion.

Naso-Pharynx and Adjacent Cavities.

A spontaneous epistaxis may usher in the symptoms of the disease. Litten (German Collective Reports) says that it was common during the epidemic of 1890. Leichtenstern estimated it to occur in 2% of cases. In former epidemics the frequency of epistaxis is especially mentioned. (Theophilus Thompson, Annals of Influenza).

In the early stages, in many cases, an acute rhinitis occurs, which, except for the presence of general symptoms,- such as rigors, pains and fever,- cannot be distinguished from an ordinary acute catarrhal rhinitis; indeed, the patient often first complains of a cold in the head with accompanying loss of smell, and the general appearance of the patient presents the typical picture of acute coryza.

The catarrhal inflammation extends up the lachrymal ducts producing "watery eyes", and not infrequently it may spread to the sinuses communicating with the nasal cavity; empyema of the antrum of Highmore is not an uncommon sequel of influenza; it is possible, also, that the intense and protracted frontal headache sometimes met with in these cases may be due to a local inflammatory process in the frontal sinus.

Larynx.

Acute catarrhal inflammation,- accompanied by hoarseness, rawness, and difficulty in swallowing,- is not uncommon. In rare instances acute septic oedematous laryngitis occurs, which may lead to extensive ulceration, sloughing and necrosis of the cartilages.

Haemorrhagic laryngitis has been noted, and haemorrhage may occur from the intensely hyperaemic mucous membrane, the blood being coughed up with the sputum.

Trachea and Bronchi.

Inflammation of the tracheal and bronchial mucous membrane is one of the most important and frequent local affections due to influenza. If not primarily involved, it is very liable to be affected by subsequent extension of the inflammatory process from other parts of the respiratory tract,- e.g., the nose or larynx.

The tracheitis which occurs is characterized by the burning pains which are present along the course of the trachea, and under the sternum, pressure upon which is painful and produces cough; it is probably this inflammation of the trachea which gives rise to the paroxysmal and convulsive cough which occurs in so many cases of influenza, and which in

the older epidemics, caused the disease to be named "Coqueleuche", a name which is afterwards given to whooping-cough.

The bronchitis of influenza is often very rapidly developed, but usually appears about the fourth day of the disease. It is accompanied by pain and rawness behind the sternum, and there is occasionally marked dyspnoea, which may be out of all proportion to the physical signs. These attacks of dyspnoea constitute the so-called respiratory crises. There may be, in these attacks, great pain in the chest, violent cough, and symptoms of spasm of the glottis. Graves (London Medical Gazette, vol.XX, p.10) drew attention to these attacks, which he considered to be of nervous origin. Huchard (Gaz.des Hôp., 1890, 18) refers to a condition of bronchial paralysis as occurring in some cases of influenza and giving rise to respiratory crises; he termed the condition "bronchioplegia".

The bronchitis may be diffuse and distributed over all the bronchial ramifications, or it may be limited to one portion of a lung or lobe and quite sharply defined, pointing to the local development of the influenza bacilli in a definite part of the bronchial tract.

The physical signs are very indefinite; at first there is merely hyperaemia, so that, at the outset of the attack, there is frequently hardly any sign of secretion in the bronchial tubes. Swelling of the bronchial mucous membrane usually soon supervenes, and this is manifested by a louder inspiratory murmur at certain points, or by a harsher inspiratory sound. As a rule, it is not long before there is secretion from the mucous membrane, and then, on auscultation, there are the physical signs of bronchial catarrh, with great variety in the character of the râles.

The sputum varies in different cases. In some it is serous and copious in amount and, when allowed to settle in a vessel, shows an upper layer of greyish froth; next, a layer of serous material; while the bottom of the receptacle is covered by a thin layer of mucus of turbid deposit. In other cases it is yellow or greenish-yellow, and may be nummular and not unlike the sputum in phthisis. It is sometimes tinged with blood, which gives it a peculiar flesh-like tint. In some cases the amount coughed up is copious - as much as one or two pints a day. In rare cases fibrinous casts are coughed up.

ALIMENTARY SYSTEM.

This system suffers most in the gastro-intestinal form of influenza referred to above.

The tongue is, as a rule, heavily coated with a dirty-white fur, especially in the gastro-intestinal form of the disease; but it cannot be asserted that a peculiar state of the tongue always accompanies influenza. It may have an intensely red appearance, which is considered by some to indicate an inflammatory condition, or actual glossitis.

Anorexia is invariably present, and may be of long duration, lasting well into convalescence. It may amount to an actual loathing of food, and it is frequently accompanied by a bad taste in the mouth. On the other hand, there may be loss of taste; this is often a marked symptom of influenza, and appears to be due to the action of the toxin on the nerves of taste, for it may persist long after other symptoms have disappeared.

Nausea and vomiting sometimes occur as initial symptoms. The vomiting may be slight at first, but is sometimes very severe and accompanied by great pain and tenderness in the epigastrium, constituting gastric crises similar to those seen in locomotor ataxy.

The vomited matter may contain blood, and the quantity of vomit is often much greater than can be accounted for by what the patient has ingested.

In other cases the bowel suffers and the patient is seized with severe diarrhoea accompanied by violent abdominal pain. The motions are numerous,- as many as twenty or thirty in the twenty-four hours,- and, usually bilious and foetid at first, they may afterwards consist entirely of blood and mucous.

Case:- F.B., aged 30, travelled to London to stay some days with his brother. On arrival there he found him ill in bed with a severe attack of influenza. F.B. stayed one night with his brother and then returned home. Two days after his return the writer was called to see him. The patient was in bed, and stated that in the early hours of the morning he had been suddenly seized with severe pain in the abdomen, and diarrhoea. Vomiting was incessant, the vomities consisting chiefly of bile and mucus. In four hours the patient had had seven motions, and the stools were watery and extremely foul-smelling. The temperature was 103°F, the pulse 100 and very soft. The tongue was heavily coated with thick heavy fur, and the breath was almost foetid. The patient complained of great weakness and severe frontal headache, and there was absolute anorexia. Under treatment the patient's condition improved, and the vomiting ceased, but the bowels remained loose for a few days. The temperature remained about 101°F for four days, and then fell to normal; and, except for severe prostration, the patient became convalescent.

After the respiratory system, the nervous system is most frequently affected in influenza.

The symptoms arising may be inflammatory,- e.g., encephalitis, meningitis, etc.- and due to the invasion of these parts by the influenza bacilli, or they may be functional, and produced by the toxins originating from these micro-organisms.

Headache is the most common symptom in the nervous form of influenza. It is of an extremely severe nature and generally accompanied by giddiness; it is usually in the frontal region or the orbit, and when in the latter situation any movement of the eyes accentuates the pain. It is usually of a dull and heavy character, but may be throbbing or stabbing, and in such cases the pain is aggravated by movement. The pain is continuous and worse at night, and thinking and talking are beyond the patient's power.

The headache is probably due to the congestion of the meninges, but, in very severe cases, it may be due, as mentioned above, to inflammatory deposit in the frontal sinus following rhinitis.

Pain in the limbs and trunk usually accompanies the headache. This pain is of a neuralgic character, is often very persistent, and may last well into convalescence. The nape of the neck, the loins, thighs and knees are the chief seats of the pain, and in the limbs it may be so severe as to simulate the pains of Dengue.

Delirium frequently occurs in the febrile stage of influenza, and also as a consequence of the severe headache; but, on the other hand, it may by itself be the chief symptom and overshadow all the other signs of the attack: it may indeed occur before even the temperature or pulse-rate rises.

Ewald (Deut.Med.Woch.,Jan.23,1890) reports a case of this kind. A boy, aged seven, appeared to be in his usual health when starting for school one morning: but instead of going to school, he went to the railway station and took a seat in a carriage, saying he was going to Leipzig, where his father lived. He was removed from the train but appeared to have forgotten his name and address. He was taken home, and there became quite delirious; fever and other signs of influenza soon appeared, but he continued delirious for some days. The patient ultimately completely recovered.

In other cases the delirium is more prolonged and of a more violent character, and patients in this condition have been removed to lunatic asylums. Such cases usually make a rapid and good recovery.

In the alcoholic, influenza may precipitate an attack of delirium tremens. The writer recently saw such a case in a very intemperate publican who had had two attacks of delirium tremens previously. He was one evening suddenly taken with typical signs of influenza - e.g., rigors, fever, coryza, headache and pains about the limbs. He was put to bed, and two days afterwards developed well-marked delirium tremens with terrifying delusions. The attack was of a very severe nature, and lasted seven days; but the patient recovered, although his physical and mental condition remained very weak for many days.

Another mental state which sometimes occurs during an acute attack of influenza is that of profound depression, sometimes amounting to actual melancholia. In this state the patient may develop suicidal tendencies, and such cases need very careful attention. As a rule, the condition disappears with the fall of temperature, and there is usually total forgetfulness of what has occurred. This condition must not be confounded with the psychoses which may arise during convalescence from influenza; these will be considered under the heading of complications.

In other cases the disease may set in with somnolence and coma, and such cases may terminate fatally, although this is not always the case, for Aikman (Glasgow Medical Journal, June, 1890) and Macphail (Ibid. Sep. 1890) have reported cases in which the first symptom of the disease was coma and in which recovery occurred.

The simple coma due to the influenza toxin usually runs its course accompanied by high fever and slow pulse, which distinguish it from uraemic and diabetic coma. Wilfred Harris (British Medical Jour., March 2, 1907) reports the case of a plasterer, aged 38, who, while at work, was overcome by giddiness and suddenly fell down unconscious. On his admission to the hospital his temperature was 102.4° F and the pulse 72. The case proved to be one of influenza and the patient ultimately completely recovered. An interesting point in connection with this case is the fact that the patient had had two previous attacks of influenza, four years and fifteen years before, both of which had commenced in a precisely similar manner.

In May, 1890, a disease appeared in some parts of Northern Italy which was supposed to be a form of influenza. It set in with fever and delirium which was soon folled by coma, in which most of the patients died. Pneumonia was present in most of the cases, and on this ground Leichtenstern objected to Tranjen's theory that the disease, which was called Nona, was an epidemic of cerebro-spinal meningitis. He, Leichtenstern, considered the disease to

be meningitis of influenzal origin.

CIRCULATORY SYSTEM.

Influenza affects the heart in various ways. It is affected, in the first place, by the accompanying pyrexia, and there is a direct effect produced upon it by the congested state of the pulmonary circulation which is characteristic of influenza.

The influenza toxin may have a direct effect upon the heart muscle, but it acts more strongly upon the cardiac nervous apparatus.

The Pulse.- As a rule the pulse-rate corresponds with the height of the fever, but this is by no means always the case; usually the tachycardia is proportionately higher than would be expected from the degree of pyrexia present, but the reverse condition is not infrequently met with, more especially in the nervous and gastro-intestinal forms of the disease, when the temperature may be 101°F or 102°F, and the pulse-rate not over 100. In other cases there may be well-marked bradycardia; indeed, this condition occurs more frequently in influenza than in any other infectious disease. It may be either absolute, i.e.,a pulse-rate of 50 or 60 without pyrexia, or relative, i.e., a pulse-rate of 90 or 100 with a temperature of 102°F or higher.

Another condition of the pulse which is sometimes met with is that in which the rate is constantly varying every few seconds.

These conditions of the pulse are a strong indication of the neurotoxic character of influenza, for the various changes in the pulse-rate met with in this disease are undoubtedly due to the action of the toxin on the vagus centres regulating cardiac action.

In rare cases, even in uncomplicated influenza, there may be a constant feeling of giddiness, and syncopal attacks may occur four or five times during the first day of the illness. The pulse then may be either very rapid and almost imperceptible, or slow and intermittent.

These attacks constitute the so-called "Cardiac Crises", which are of grave significance. The patient, well and strong before the attack of influenza, may suddenly die of syncope. There may be no pain, but simply a feeling of utter prostration rapidly proving fatal; in other cases there may be precordial pain of an anginal or neuralgic character, followed by giddiness, palpitation, stupor and death.

Should the patient survive, the heart's action may remain irregular for weeks afterwards; there may be either bradycardia or extreme tachycardia, and any slight effort may lead to another cardiac crisis.

Pawinski has shown that patients who have, previous to the attack of influenza, suffered from heart disease, are more liable to be affected by cardiac crises than when the heart has been healthy, although the attacks undoubtedly do occur in patients who have not previously suffered from any cardiac affection.

Case:- The writer was called to see a patient, a woman aged 35, who had always previously been strong and healthy. The history her husband gave was that, two days previously, she had had a severe shivering attack, and had complained of violent headache and pains about the limbs and body. She had felt feverish and quite prostrate and had then taken to her bed. She thought she was suffering from influenza, which was undoubtedly the case, but, hoping that she would get over it after a few days in bed, she did not call in a doctor. On the second evening after the commencement of the attack, the patient was sitting up in bed to take some food, when she was suddenly overcome by a feeling of intense precordial distress, and, as she afterwards told the writer, she thought she was dying. On the writer's arrival he found the patient to all appearances moribund. The face was very pallid, the extremities cold, and the skin covered with a clammy sweat. The breathing was very shallow, and the pulse small and so rapid that it could not be counted at the wrist. On auscultation over the apex-beat, the heart sounds were almost inaudible. Hot applications were made to the precordia, ether and strychnia given hypodermically, and the patient gradually rallied. No further attack occurred until ten days afterwards, when the patient, against orders, attempted to get out of bed, and a similar attack occurred, although not of such severity.

The blood in influenza does not show constant or well-marked changes.

Leucocytosis was regularly observed, even in uncomplicated cases, by Kollmann, Freidrich, Laveran and others. It is also stated by some observers that there is decrease in the erythrocytes and haemoglobin; but it is very doubtful if this occurs in all cases.

There is certainly a peculiar tendency to haemorrhages of various kinds in the course of influenza. The occurrence of epistaxis has already been considered, and haemorrhage from the pharynx, larynx, bronchi, intestines, kidneys and uterus are also occasionally met with. Purpura haemorrhagica occurring in the course of influenza is not unknown.

This tendency to haemorrhage is probably explained by the extreme hyperaemia which chacterises all the inflammations occurring in influenza.

GENITO-URINARY SYSTEM.

The influenza toxin does not affect the kidneys in the same way as do the toxins of other infectious diseases, such as diphtheria or scarlet fever.

Acute nephritis is extremely rare. A trasient and slight albuminuria may sometimes be observed during the acute attack of influenza, but it is more probably due to the high fever or to congestion of the kidney than to any action of the toxin.

The urine is, as a rule, diminished in quantity, and, in rare cases complete anuria may occur and last for some hours, which, considering the high temperature and the excessive sweating which is so liable to occur, is not very remarkable. As in most febrile affections, the urine has a high colour and its density is increased. Haematuria has been observed in rare instances.

Women suffering from influenza are particularly liable to derangement of the menstrual functions. The attack may cause a premature menstrual period, or, if it has ceased normally a few days before the onset of the attack, may cause its recurrence. The flow is often very profuse during an acute attack, and may increase to true menorrhagia. In some women who have passed the climacteric an attack of influenza may cause the menstrual flow to be renewed.

Influenza often leads to abortion; and this may occur at any period of gestation, and is probably due to haemorrhage into the membranes, though it may be induced by the violent paroxysms of coughing which occur.

After an epidemic of influenza the birth-rate is sensibly reduced. A.Bloch showed that, in France, the number of births in the epidemic year of 1890 was 42,500 less than in 1889.

J.Mackenzie (Influenza, Medical Reprints, July 15, 1891) also asserts that the late epidemic of influenza caused a great increase in the number of premature births.

CUTANEOUS SYSTEM.

It is very common in influenza to find the skin of the face reddened and swollen, probably due to paralysis of the muscular coats of the blood vessels. This redness of the skin may spread over the whole body, and, as it is not always of uniform distribution, the patches of redness may present an appearance similar to the exanthem of measles or scarlet fever. The eruption generally occurs during the febrile stage, and, as it is usually accompanied by coryza and sometimes by painful affections of the throat, the similarity to measles or scarlet fever may become very great.

No special eruption peculiar to influenza has been observed. Herpetic eruptions may occur on the lips and face, but this is most common in those cases complicated by the presence of pneumonia. Miliary vesicles are of very frequent occurrence, but this is not to be wondered at, considering the profuse sweating which may occur.

The sweats in influenza may be so severe as to give rise to the suspicion of the presence of some grave septic condition. They are very common in the acute attack, are very obstinate in their tendency to recurrence, and may outlast all the other symptoms of the disease; indeed, they may only die out after many weeks or months.

C O M P L I C A T I O N S A N D S E Q U E L S.

No acute infectious disease shows such a variety of complications and sequels as does influenza. These are best considered together, otherwise frequent repetition would be necessary; in some cases, indeed, it is not easy to say which is a complication and which a sequel of the disease.

DISEASES OF THE RESPIRATORY SYSTEM.

Naso-Pharynx and Adjacent Cavities.

As mentioned under symptomatology, the frontal and ethmoidal sinuses and the artrum of Highmore are sometimes affected by an extension of the catarrhal processes from the nasal mucous membrane; the result may be an empyema in one of these situations, which gives rise to great pain and requires

surgical interference. The condition may also spread along the Eustachian tube, and cause an acute suppurative otitis media, with possible involvement of the mastoid cells.

Pharynx.

A diffuse inflammatory condition of the naso-pharynx and pharynx is of frequent occurrence during or after an attack of influenza.

Follicular tonsillitis is not uncommon, and the lacunar deposits may coalesce to form a false membrane extending on to the fauces. The writer has seen several cases of quinsey following influenza.

Larynx.

Laryngitis is not an uncommon complication of influenza; simple hyperaemia of the laryngeal mucous membrane is common during the acute attack, and may be present as late as two months after.

In some cases haemorrhagic laryngitis occurs, and there may also be intense inflammatory oedema which may require tracheotomy.

Le Noir, (Ann.des Malad.du Larynx,etc.), has described the occurrence of ulceration of the vocal cords after influenza; and a case of ulcerative laryngitis with gangrenous ulcers is mentioned in the German army report.

The deeper portions of the mucous membrane may be infiltrated and then the muscular tissues may become invaded, giving rise to motor disturbances in the larynx, although many of the paralytic symptoms connected with the larynx are undoubtedly of nervous origin, and are not directly dependent on the local lesion.

The Lungs and Bronchi.

Of all the complications of influenza, pneumonia is the most important.

Looking at the history of previous epidemics of the disease as set out in Theophilus Thompson's "Annals of Influenza", one sees that there has never been an epidemic which has not been marked by frequent pneumonic complications. The question whether pneumonia is only a complication or an actual part of the pathologic process, has always been much discussed.

One view was that influenza merely depressed the vitality and prepared a suitable nidus for the pneumococcus to settle and develop upon; and this view gained support by the discovery in such cases, of the diplococcus lanceolatus. On the other hand, Leichtenstern put forward the theory that there is a primary influenza pneumonia, or an actual inflammation of the lung caused by the influenza bacil-

lus; and he was supported in this view by Drasche, (Weiner.med.Woch.,1890) and others. Pfeiffer showed that, in such cases, influenza bacilli were to be found in large numbers in the pneumonic exudate within the pulmonary alveoli. One must therefore consider the form of pneumonia complicating influenza as a separate variety and quite independent of ordinary croupous pneumonia.

This form of pneumonia set up by Pfeiffer's bacillus is essentially of the lobular and catarrhal type, and is probably due to a direct extension of the catarrhal processes from the bronchi and bronchioles to the pulmonary alveoli, constituting, really, a broncho-pneumonia. Other forms of pneumonia, due to mixed infections, are, however, met with.

In the true influenza pneumonia the initial rigor is frequently absent. The temperature often shows marked remissions or even intermissions. Typical rusty sputum is rarely present, because the concurrent influenzal bronchitis causes, as a rule, a profuse purulent secretion. There is usually marked cyanosis and dyspnoea, which may be altogether out of proportion to the amount of pneumonic infiltration present. From the outset of the attack there is marked cardiac weakness and tachycardia.

The physical signs differ greatly from those observed in true croupous pneumonia. The first indications often are the occurrence of small scattered areas of diminished resonance. The dulness over these areas is not well marked, and merges gradually into the normal resonance of the healthy lung tissue. Over these dull areas the breath sounds are harsh, never really tubular, and are accompanied by fine crepitant râles and slight bronchophony.

While, in most cases, the base of the lung is affected, in others the apex is the seat of the complication, and in others, again, the pneumonia appears to wander over different parts of the lung irregularly; thus the lower lobe of one lung may be first affected and followed by the upper lobe of the other.

The fever ends, as a rule, by lysis and not by crisis; but an unfavourable termination of the disease is frequent. In such cases the dyspnoea becomes more marked, delirium sets in, and the patient gradually sinks. In patients who recover, convalescence is very slow, and relapses are not at all uncommon.

Other forms of pneumonia, due to mixed infections, are met with. When pneumococcic pneumonia attacks a patient suffering from influenza, the symptoms are often out of all proportion to the extent of the local lesion. The dyspnoea is usually much greater than that observed in acute pneumonia. The cough is severe and accompanied by blood-stained

sputum containing pneumococci; the typical rusty sputum may be absent. An initial rigor is rare, but profuse sweats commonly occur.

Physical examination reveals the presence of a dull area over which the breath sounds may be weak or absent; bronchial breathing and bronchophony are rare. The fever runs an irregular course and terminates, as a rule, by lysis.

Another form of pneumonia which sometimes complicates influenza is what has been called cellular pneumonia. It begins very suddenly, and rapidly invades the entire lobe of one lung. The pathological changes in this form are similar to those found in pneumonia due to the streptococcus, and it is probably due to a mixed infection.

The Pleura.

Pleurisy is not an infrequent complication of influenza. Usually it is serofibrinous, but it may be purulent. Mitchell-Bruce (Lancet,May 3,1891) saw several cases of empyema after the epidemic of 1890; and Pfeiffer found the influenza bacillus in purulent pleuritic effusions.

A form of acute pleurisy has been described, which comes on almost simultaneously with the onset of influenza. This may be an extremely grave complication, and is characterized by rigors, high fever, severe dyspnoea and cyanosis. It is usually accompanied by a rapidly developing exudate, which is seropurulent, opaque, and of a peculiar yellow colour. Leichtenstern (Influenza Lectures,pp.4 & 57) has, in a number of post-mortem examinations, demonstrated the fact that this affection of the pleura is a primary one, and occurs without the presence of inflammatory infiltration of the lung tissue.

Besides these forms of pleurisy with effusion, a dry pleurisy is occasionally met with as a complication of influenza. In these cases a well-marked pleuritic rub is usually present, and is often of considerable extent and so well-marked as to be easily made out by palpation.

Influenza is in many cases the starting point of pulmonary tuberculosis; the influenza bacillus seems to prepare the way for a further invasion of the lungs by the tubercle bacillus. Of 374 patients suffering from phthisis under the writers care in a Sanatorium for consumptives, 56 dated the onset of the disease from an attack of influenza. In the case of a patient with a quiescent tuberculous lesion in the lung, an attack of influenza sometimes appears to excite it to renewed activity.

Tongue and Mouth.

Glossitis occasionally occurs as a complication of influenza. It may occur simultaneously with the acute attack and disappear as the fever subsides, or it may last for some time after convalescence.

Cases of stomatitis, simple and even ulcerative, have been described; and haemorrhages from the gums, tongue and pharynx are mentioned in the literature.

Salivary Glands.

Parotitis has been seen as a complication of influenza. Three cases were reported in the "British Medical Journal", July 11,1891. In each case there was intense swelling of the parotid gland, with great general prostration. In two of them a fatal result occurred early. Other cases of parotitis following influenza have been reported.

Stomach and Intestines.

In most cases of influenza there is some hyperaemia of the gastro-intestinal mucous membrane, and this is specially marked in the gastro-intestinal form of the disease. This hyperaemia is possibly sufficient to account for the intestinal haemorrhage which may occur, and which is analagous to epistaxis and the influenzal haemorrhages from the larynx, trachea and bronchi.

This hyperaemia may be the precursor of an intestinal catarrh, which, in rare cases, may addvance to necrosis and ulceration. Klebs has reported a case in which he found ulceration of Peyer's patches, which gave rise to a suspicion of enteric fever. Similar cases are mentioned by other observers.

The lower portion of the ileum and the caecum may become involved in the influenzal enteritis, and the symptoms of appendicitis may be exactly simulated. Tessier has described such cases as typhlitis and perityphlitis caused by influenza; and Leichtenstern considered them to be a true typhlitis, that is to say, an inflammation of the caecum without involvement of the appendix. Goluboff is inclined to regard all cases of appendicitis which come under treatment during the course of an epidemic of influenza, as complications of that disease; while Schulte (Deut.med.Woch.,1903,29) on the other hand, considers that, while the conditions may be associated, they certainly originate independently of each other.

The severe form of influenzal enteritis may lead to peritonitis, accompanied by serofibrinous or purulent effusion. Cases of post-influenzal peritonitis are mentioned in the literature by Kundrat (Wiener.klin.Woch.), Wallis (Hygeia,Bd.lii),and other writers, and also in the official German collective investigations.

Anorexia and gastric symptoms may last for weeks after the influenzal attack has declined, so that marked loss of weight may occur, giving rise to the so-called "influenza cachexia". Cases of this kind have been described in which suspicion of the presence of malignant disease had arisen.

The Liver.

No very important changes occur in this organ as a sequel to influenza. Hyperaemia and cloudy swelling have been observed, and in some cases, thrombotic formations have been found. An exceedingly rare complication is absess of the liver. Krannhals (Die Influenza in Riga,etc.,1891) has reported four cases of this kind.

Reports as to the occurrence of icterus as a complication of influenza vary greatly. In the older epidemics the occurrence of icterus is mentioned as an occasional symptom. Peacock, in his description of the epidemic of 1847-48, draws attention to the fact that there was generally an icteric hue of the conjunctiva or of the skin generally. Baumler, in the epidemic of 1890, found a slight form of icterus present so constantly that he regarded it as a diagnostically important symptom of influenza; on the other hand, Leichtenstern states that, in 349 cases, he found it present only twice. The English authors, Preston, Bristowe and Parsons, do not mention the occurrence of icterus; nevertheless, it undoubtedly does occur in some cases of influenza, and when present, is probably of a catarrhal nature.

The Pancreas.

In very rare cases this organ becomes affected as a sequel to influenza, and cases of diabetes from this cause have been reported by Saundby (British Medical Journal,May 10,1890), Fischel (Prager.med.Woch.,1890) and Villard ("Lecons cliniques sue le Grippe", Paris,1890).

DISEASES OF THE NERVOUS SYSTEM

There is no doubt that influenza may be the direct cause of many diseases of the nervous system, although it is doubtful if, when such diseases as locomotor ataxy and disseminated sclerosis develop after an attack of influenza, the influenza can be regarded as the cause of their onset; it would be more logical to look upon the influenza as an intercurrent affection which possibly caused an already incipient but unnoticed nervous disease to develop more rapidly than it otherwise would have done.

The Brain and Meninges.

In rare cases an acute haemorrhagic encephalitis may occur as a complication of influenza. The condition may be quite localised or more general, and may result in monoplegia or hemiplegia; or, in other cases, grave cerebral symptoms, such as coma, or convulsions may be present. When occurring as a complication of influenza it is likely to appear between the second and seventh days of the illness. Leichtenstern (Infl.Lect.,p.29) reported several cases of this kind. The condition usually sets in with an apophectiform seizure, and may be followed by coma lasting several days. Leichtenstern regards the condition as due to foci of capillary emboli made up of influenza bacilli. The grey matter is found to contain minute points of haemorrhage and the nerve cells are swollen and exhibit chromatolysis.

If the patient recovers from the initial attack, the symptoms resulting from the cerebral lesion will depend upon the part of the cortex affected; if the Rolandic area has suffered, hemiplegia will result; if the mischief lies in the frontal lobes, there may be permanent mental derangement. A case of this description is recorded by Furbinger (Deut.med. Woch.,Jan.21,1892). The patient, a man of 32, was seized with symptoms of influenza, a few days afterwards he became dazed, lost consciousness, and then developed mania which was followed by coma. The temperature rose to 104°F, and the patient died on the eighth day of the illness. Post-mortem haemorrhagic encephalitis of a considerable extent and great severity was found.

Meningitis is not an infrequent complication of influenza. Apart from cases in which the disease has arised by direct extension from post-influenzal empyema of the nasal sinuses, many cases of primary meningitis are recorded as having arisen at the height or even at the beginning of an attack of influenza.

Leichtenstern (Deut.med.Woch.,May 29,1890) records the case of a woman who had influenza and

then developed vomiting with rigidity of the neck and retraction of the head. She died in coma ~~xx~~ four days after the onset. Post-mortem, there was found haemorrhagic pacchymeningitis, with pus along the larger blood vessels.

Cases are also reported by Nicholson (Brit. Med.Journal,June 13,1891), Bristowe,(Ibid.,July 4, 1891), and others.

The presence of the influenza bacillus in the pus of such cases has been demonstrated.

Abscess of the brain may develop after influenza. Bristowe (British Med.Journal,July 4,1891) has reported four such cases. It may arise as a direct consequence of infection by the influenza bacillus, and without any concurrent purulent otitis or suppurative processes in the frontal sinuses or cranial bone disease. The specific organism of the disease has been found in the pus of such abscesses by Pfuhl (Deut.med.Woch.,1895,29).

The Spinal Cord.

Acute myelitis has been observed to complicate influenza. It is usually cervical and accompanied by meningitis; or it may be scattered in separate foci throughout the cord. Paraplegia first develops, flaccid at first but becoming spastic later if the patient survives. Muscular wasting occurs in groups of muscles, and is distributed according to spinal segments and not to peripheral nerve supply. Anaesthesia of the lower part of the trunk and lower limbs us usually present, and severe bed-sores may develop.

Cases of ascending myelitis have been recorded following an attack of influenza. This is invariably fatal, starting with loss of power and anaesthesia in the lower extremities and spreading up to the trunk, so that by the end of a week, the whole of the lower part of the body may be anaesthetic and paralysed, and respiration may be carried on entirely by the diaphragm. The reflexes are lost from the commencement, and the reaction of degeneration is early present in the muscles of the lower extremity. Férégol (Soc.Med.des Hôp.,Jan.24,1890) has recorded such a case in a medical man who suffered from influenza. During convalescence paraplegia supervened, and gradually spread upwards to the bulb and led to a fatal result.

Landry's paralysis may also occur, differing from ascending myelitis, clinically, in the absence of any marked degree of anaesthesia or muscular wasting. Post-mortem, in cases of ascending myelitis the whole cord, more especially in the lumbar region, is found to be swollen and almost diffluent, with small haemorrhages scattered throughout the

substance. The pia-arachnoid is also involved in the inflammatory process, and the condition is really a spreading meningo-myelitis.

The Peripheral Nerves.

True neuritis may occur in some cases; thus, the fifth nerve may be attacked, causing weakness of the jaw muscles, with pain and anaesthesia over the face and inside the cheek. Bell's paralysis may result from post-influenzal neuritis of the seventh nerve.

Neuritis of the lumbar plexus on one side, producing sciatica, is fairly common after influenza.

These post-influenzal nerve inflammations usually clear up entirely in young people, but in older patients the symptoms are very difficult to get rid of.

Paralysis may occur due to neuritis; sometimes this is localised to single nerves and produces isolated paralysis. On the other hand, there is a multiple degenerative neuritis which may occur after an attack of influenza, and which is of great importance. Remak (Berlin.klin.Woch.,Feb.24,1890) reports the case of a man who had influenza which was compli cated, within a week, by paralysis of all four extremities due to a multiple degenerative neuritis.

Neuralgias and myalgias are very common complications and sequels of influenza. There is scarcely a sensory nerve which may not be the seat of severe neuralgia during an attack of influenza. The severe pains which are usually felt about the body and limbs are probably of a neuralgic nature, and they may persist for some time after the acute attack has passed off.

Accompanying the neuralgia there may be hyperaesthesia, either along the course of particular nerves or generally distributed. The neuralgia may, in some cases, be followed by herpes zoster.

Many patients during the attack of influenza complain of the loss of the senses of smell and taste, and this condition may be prolonged for many months after the acute illness has passed off. Cases of permanent loss of the sense of smell after an attack of influenza are recorded. Such cases have probably been due to actual inflammation of the olfactory nerves.

POST-INFLUENZAL NEUROSES.

Epilepsy has been observed to develop as a sequel to influenza. Such cases have been reported by Althaus (Influenza,p.204), Neale (British Medical Journal,Feb.27,1892), and others. These cases usually recover; on the other hand, in patients who have previously suffered from epilepsy, and who have reason to believe that they have been cured, an attack of influenza may induce a relapse of the epilepsy, which may continue in an aggravated form.

Tetanoid spasms, chorea, and hysteria are also mentioned as sequels to influenza by some observers. Leichtenstern (Infl.Lect.,p.28) records three cases of typical post-influenzal chorea in children.

All forms of hysteria have been observed after influenza - especially hysterical convulsions and the so-called hystero-epileptic attacks.

POST-INFLUENZAL PSYCHOSES

The delirium which sometimes accompanies the fever of influenza has been spoken of elsewhere. It is usually of short duration, and lasts only so long as pyrexia is present; on the other hand, morbid psychical states may arise as the direct result of an attack of influenza, and they are of a more lasting and more serious nature.

These psychoses occur after the fever has subsided and when the patient has entered upon convalescence. It was at one time considered that they were due to the nervous exhaustion produced by the acute disease, but Leichtenstern pointed out that this could hardly be the case in a disease in which the acute attack is so short as it normally is in influenza. He advanced the view (Infl.Lect.) that they are due to the poisonous action upon the cerebral cortex, of the influenza toxin; this theory is now generally accepted, and post-influenzal psychoses are now always classified under the toxic insanities.

Opinions vary as to the effect of hereditary and other neuropathic influences on the production of these post-influenzal psychoses. According to Mehr, Krapelin, Ladame, and others, the occurrence of these conditions depends upon an hereditary or acquired psycopathic condition; while, on the other hand, Leichtenstern, Bossers, Gray, Althaus, Shaw, Savage, Robertson and many others, mention cases in which there has been no hereditary taint.

The most frequent form of post-influenzal psychosis is that of severe depression and melancholia. In this form, the patient, after an attack of influenza, falls into a gloomy habit of thought

and frequently contemplates suicide, and, if not carefully watched, may destroy himself. Snell (Alleg. Zeitschrift.Psychiatre.,Berlin,1890,p.418) reports the case of a girl of 18, in whom melancholia developed after an attack of influenza. She committed suicide by hanging herself.

Ladame (Annals.Medico-Psycho.,Paris,1890, p.20) relates the case of a lady who had an attack of influenza lasting two days; soon afterwards symptoms of melancholia were noticed. She refused food, would not get out of bed, and took no interest in her family or surroundings. The condition lasted two months, and she then began to improve, and ultimately recovered. Many other similar cases are reported in the literature, and, as assistant medical officer at one of the London asylums, the writer saw several cases of melancholia which were attributed to influenza.

Another form of post-influenzal psychosis which is sometimes seen but which is not so common as melancholia, is a state of maniacal excitement. The symptoms of this condition are apt to occur either immediately after the fall of temperature, or within a week or two after the temperature has subsided. Delirium sets in which may be of a maniacal character, and lasts for days or even weeks, after which the patient may recover, or pass into a condition of melancholia or dementia. In some cases there are well-marked delusions.

Mairet (Montpelier Med.,Mai et June,1890) describes the case of a patient, a man aged 50, who had a slight attack of influenza. Five days after the attack he went out, but soon returned home complaining of severe headache; almost immediately afterwards he had an attack of violent delirium with hallucinations and delusions of persecution. He behaved violently towards his attendants and had no sleep. After a fortnight the delirium subsided, and the patient ultimately quite recovered.

Other forms are what Bidon has called "idiopathic psychoses", or forms of mental affection of different times not characterized by the usual symptoms of depression or excitement, lasting several weeks, but of favourable prognosis.

Some writers have described cases of acute paranoia, and even of general paralysis of the insane, as resulting effects of the influenza toxin; but such forms are exceedingly rare, and some doubt must be attached to their real connection with the disease in question.

The ocular complications which accompany or follow influenza are decidedly rare. Many affections of the eye which have been described as being the result of influenza are probably due to other causes, such as syphilis.

Conjunctiva.

Acute catarrhal conjunctivitis is not an uncommon complication of influenza; in most cases there is well-marked congestion of the conjunctiva, and, in some, this may go on to actual catarrh.

Cornea.

Herpetic vesicles may occur upon the cornea, and they are usually associated with herpes along the course of the supra-orbital nerve.

Iris.

The iris may become congested in the early stage of the disease. Hosch (Corres.Bl.f.Schweiz., 1890, 1,3) describes a case of iritis following influenza. Glaucoma has been observed as a sequel to influenza.

Optic Nerve.

Instances of optic neuritis followed by optic atrophy and blindness, as a sequel to influenza, have been reported. Optic neuritis is also present in cases of meningitis and cerebral abscess due to influenza.

Motor Nerves and Muscles.

In some cases of influenza there is intense pain in the eyeballs which is aggravated by movement. This is possibly due to a slight myositis or perineuritis.

After the acute attack paresis of accomodation is not uncommon, and this condition is much more likely to occur in young people who have latent hypermetropia. The condition is due to the asthenia following the febrile state.

Cases of paralysis of the muscles supplied by the third, fourth, and sixth nerves have been reported, usually due to peripheral neuritis; ptosis and strabismus with diplopia may occur in consequence.

The Orbit.

Exophthalmos, with displacement of the eyeball downwards, may occur when there is purulent sinusitis of the frontal, and anterior ethmoidal sinuses.

Callan (Med.Record,June 12,1890) has re-

ported a case of exophthalmos and external ophthalmoplegia following influenza, in which, post-mortem, there was found a circumscribed sac containing fluid situated between the dura and pia mater over the sella turcica.

DISEASES OF THE EAR.

Middle Ear.

Complications in the middle ear are due to a direct spread of the catarrhal process along the Eustachian tube. The condition may be simple or suppurative.

Acute suppurative inflammation of the middle ear following influenza sometimes has typical characteristics. The onset is very rapid, and the pain and constitutional disturbance very severe. The tympanum quickly becomes hyperaemic and bulging with pus. Perforation may occur, followed by copious discharge which may last for weeks. In some cases recovery follows; in others, extension of the disease may take place to the mastoid cells, or the pus may perforate through the bone into the middle or posterior fossae, giving rise to meningitis or cerebral abscess.

If a chronic middle ear suppuration is present before an attack of influenza, it is liable to fresh infection, and to show acute signs and symptoms of extension.

The Internal Ear.

This part may be attacked by the extension of suppuration from the middle ear. Such extension is characterised by giddiness, tinnitus, profound deafness, and vomiting.

Occasionally during or after an influenzal attack, symptoms may arise which point to an acute neuritis of the auditory nerve. There is giddiness, tinnitus, and deafness in one ear. Sometimes in such cases there is also facial paresis, with loss of taste and herpetic eruption on the face and neck of the same side.

DISEASES OF THE CIRCULATORY SYSTEM.

The Heart.

Endocarditis, myocarditis, and pericarditis are all occasionally met with as a sequel to influenza; but, while in a few cases they have been shown to be due to the specific bacillus, in most cases they are the result of a secondary infection by some pyogenic organism.

Leichtenstern,(Deut.med.Woch.,May 29,1890) and Tyson,(Univers.med.Mag.,June,1890,p.494) have described fatal cases of pericarditis and endocarditis following influenza.

Pauinski,(Berlin.klin.Woch.,July 13 & 20, 1891) records cases of endocarditis following influenza in patients whose hearts were previously diseased. He distinguishes two forms of influenzal endocarditis - a benign and a malignant. He considers the characteristic features of the latter form to be the long duration of the pyrexia and the great tendency to ulceration.

Pericarditis is most frequently a sequel in cases complicated by pneumonia, or pleurisy, or articular rheumatism. It is usually of a dry character, but may be complicated by serous or fibrinous effusion.

Blood-vessels.

A more frequent sequel of influenza is phlebitis with venous thrombosis. The most frequent situation of this condition is the femoral vein, and it is usually bilateral and symmetrical.

A spontaneous thrombosis of the arteries is occasionally met with, although the condition is a rare one. Like thrombosis in the veins, it occurs symmetrically, involving the corresponding vessels in both limbs. Eichorst reports (Uber Infl.,Corresp.Blatt.f,Scweizer.Ae,vol.XX,1890) the case of a medical man who was seized with severe pains in the legs following influenza. The limbs became cold, black and gangrenous. The patient refused amputation and died within a week. Other cases are also reported in the literature.

As to the cause of these vascular thromboses, there has been much discussion. Von Leyden connects them with the disintegration of leucocytes which goes on in the vessels and acts as a focus for thrombus formation. Gerhardt, on the other hand, looks upon them as due to vaso-motor spasms, and considers the condition analagous to that found in symmetrical gangrene.

In some cases the thrombi may originate from emboli, especially in those cases where aortic arterio-sclerosis exists, or where there is chronic endocarditis. In other cases the condition may be due to the incapability of the enfeebled heart of pumping the blood through vessels already partially obliterated by disease.

DISEASES OF THE GENITO-URINARY SYSTEM

Kidneys.

A true nephritis is very rare as a sequel to influenza. On of the first cases was recorded by Leyden, who demonstrated the lesions of an acute nephritis in a woman who had died during an attack of influenza.

Sympson (Lancet,May 10,1890) reports a case of acute haemorrhagic nephritis in a boy of eleven, who recovered. A similar case is reported by Fraser (Brit.Med.Journal,June 27,1891).

Bladder.

Cystitis has occurred as a complication of influenza. Haemorrhage from the bladder has also been observed.

Cases of paresis and atony of the bladder following influenza have been recorded. Bilhaut, (Bulletin Soc.Therap.,1890,p.22) reports a case of retention of urine which lasted for a week, and Brakenridge (Edin.Med.Journal,May,1890) mentions two cases of paralysis of the bladder following influenza.

The Urine.

Polyuria and anuria have already been mentioned as occurring occasionally in influenza.

Glycosuria may occur, and diabetes mellitus is mentioned in the literature as a not infrequent sequel of influenza. The unfavourable influence of influenza on an existing diabetes has been pointed out by Kahler and others.

Male Sexual Organs.

Orchitis may complicate influenza; cases have occurred shortly after the feverish attack: such a case is reported by Kelly (Lancet,Feb.13,1892); Bungner (Berlin.klin.Woch.,1891, 22) describes a similar case terminating in suppuration and gangrene of the scrotum.

Cases of gangrene of the penis following influenza are reported by Johannsen (Petersburg.med. Woch.1890,p.413) and Devrient (Ibid. 1892).

Female Sexual Organs.

The menstrual complications and the liability to abortion during and after an attack of influenza,have been considered elsewhere.

DISEASES OF THE HAEMOPOIETIC SYSTEM.

The Spleen.

In some cases the spleen is enlarged, but very rarely is the enlargement sufficient to make the organ palpable. There is a striking difference in the reports on the subject by different observers; thus, Birch-Hirschfeld (Schmidt's Jahrbucher, vol. ccxxvi), and Jurgens (Berlin.klin.Woch., 1890, 12) declare that, as a rule, no changes are to be found in the spleen, while Ribbert (Deut.med.Woch., 1890, 4,6,15) states that he found the spleen, in a few cases, enlarged to more than twice its normal size.

Lymphatic glands.

Swelling of the lymphatic glands has been noted in influenza by some observers. The German army reports note swelling of the lymphatic glands and lymphangitis.

Thyroid gland.

Inflammation of the thyroid gland after influenza has been observed by Holz (Berlin.klin.Woch., 4,1890) and Gaucher (Bull.de la Soc.des Hôp., Paris, 194, 1890). Cases are also mentioned in the German army report.

The Blood.

The condition of the blood in influenza has already been discussed.

A case of acute leukaemia following influenza has been described by Hinterberger (Deutch., Archives für klin.Med., 1891); and a case of pernicious anaemia by Rheiner (Correspondenz Blatt.für Schweitz, 1890, 12).

DISEASES OF THE BONES AND JOINTS.

Periostitis has been seen in some cases as a sequel to grip. Witzel regards this condition as analagous to the articular disease which occurs in horses during an epidemic of epizootic disease. Cases have also been reported by Möser (Berlin.klin. Woch., 1890, 10).

Painful affections of tendons and fasciae are also met with after an attack of influenza; and in some cases synovitis may occur.

D I A G N O S I S

The diagnosis of influenza may present some difficulty. The disease may commence with so many different symptoms that one may, at first, be in some doubt as to the true nature of the ailment; but, if it be borne in mind that the attack, though sharp, is usually of short duration, this doubt may be removed by waiting twenty-four hours before pronouncing a definite opinion on the case.

The laity are usually very prompt with a diagnosis of influenza at the commencement of practically any illness, and even the mildest of nasal catarrhs is often now so designated by them. More especially is this the case with club-patients, who are very apt, when they feel "out of sorts", to inform the medical officer that they have "got the influenza", and think they ought to go "on the club" for a few days. The name is certainly of great use in signing club certificates.

True influenza is, however, such a serious disease and so far-reaching in its consequences that, when it does occur, an accurate diagnosis is of the greatest importance.

GENERAL DIAGNOSIS.

This must be based upon such factors as the following:-

1. The suddenness of the onset, which, though not characteristic, is nevertheless, suggestive in doubtful cases.

2. The general symptoms, such as:- the fever, rigors, malaise, sweating, catarrh, and the severe headache and pains about the body and limbs. The extreme prostration usually present is a symptom of great importance. Some writers lay great stress upon what they call the "characteristic tongue" of influenza, but, in the writer's experience, the state of the tongue varies considerably according to the particular type of the disease present, and every case of the disease does not exhibit the large, flabby, thickly coated tongue so graphically described by various authors.

3. The presence of an epidemic of the disease is certainly a help in diagnosing those cases which begin with obscure or unusual symptoms.

4. Bacteriological Examination.- Wherever the specific bacilli are found the diagnosis is certain. When the case is one accompanied by bronchial catarrh, examination of the sputum will reveal the presence of immense quantities of Pfeiffer's bacilli; and in the nervous or gastric forms of the disease, where there is no cough or expectoration, the bacilli may be found to be present in the blood.

DIFFERENTIAL DIAGNOSIS.

1. From Acute Lobar Pneumonia.

This disease resembles influenza in that in both there may be rigors, sudden rise of temperature, and a feeling of malaise accompanied by headache. The fact that pneumonia is not an infrequent complication of influenza also adds to the difficulty of diagnosing the true nature of the case.

Differential points are:-

	Influenza.	Pneumonia.
Onset.	Sudden.	More gradual.
Fever.	High and irregular.	High, continued.
Pulse.	Variable. Tachycardia not proportionate to pyrexia.	Usually very rapid and proportionate to pyrexia.
Respiration.	Not usually much accelerated; except in respiratory crises.	Rate much accelerated, and marked alteration in pulse-respiratio ratio.
Headache & Malaise.	Severe.	Slight.
Duration of acute attack.	2 or 3 days.	5 days at least.
Cough.	May be severe and paroxysmal.	Slight and suppressed at first.
Expectoration.	Copious. Sometimes blood-stained. Never rusty.	Scanty and rusty.
Physical Signs.	Very indefinite.	Usually well-marked and definite.

2. From Measles.

Conjunctivitis, tonsilitis, laryngitis, bronchitis and frontal headache are symptoms common to both measles and influenza. In children, therefore, when such symptoms occur, a certain diagnosis may not be possible until the fourth day, when a fresh rise of temperature and the appearance of the rash indicate measles.

In some cases the two diseases may occur together and then the clinical picture is undistinguishable from that of measles.

3. From Scarlatina.

Teisser has described special varieties of influenza under the names of ~~of~~ scarlatiniform and rubeolic. They are those rare cases in which the disease is accompanied by a rash. The differential diagnosis in such cases may be extremely difficult, and must be based mainly upon the date of appearance

of the rash and the presence, or not, of an epidemic of influenza.

In other cases the diagnosis can only be arrived at after the event, when the occurrence of desquammation will confirm the diagnosis of scarlatina, as this never occurs in those cases of influenza which are accompanied by a rash.

4. From Malaria.

Some uncomplicated cases of influenza exhibit a protracted pyrexia in which the fever shows a regular quotidian intermittent type. In such cases, during the intermission, the other influenza symptoms may be in abeyance and the fresh rise in temperature is accompanied by rigor and the defervesence by sweating, so that the clinical picture very closely resembles that of one form of malaria; and it is possible that such cases have given rise to the erroneous view that influenza is a modified malaria.

The differentiation of such cases from malaria can be made with certainty by a careful examination of the blood for the malarial parasite and the influenza bacillus; the history of the patient, as to previous attacks and residence abroad, will also aid in the diagnosis.

5. From Cerebro-Spinal Meningitis.

Those rare cases of influenza which commence with meningitis are extremely difficult to diagnose from cerebro-spinal meningitis,- unless the disease is ushered in by the typical symptoms of influenza, such as, coryza and bronchitis; in these cases the demonstration of the influenza bacillus in the sputum will establish the diagnosis.

When the meninges at the base of the brain are first invaded by the influenza bacillus, the differentiation between the condition and epidemic cerebro-spinal meningitis, is often impossible. Both diseases begin with sudden chill and high fever, and cervical rigidity sets in at once. In both herpes labialis occurs, although more frequently in epidemic cerebro-spinal meningitis.

A point in the differential diagnosis upon which Leichtenstern (Centralb.f.allg.Gesundheitspflege,1893,12) lays stress, is the simultaneous occurrence of pneumonia. He and Tranjen both maintain that this condition does not occur in the epidemic form of meningitis, but is a common complication of the influenzal variety.

The discovery of the meningococcus intracellularis in the cerebro-spinal fluid drawn off by lumbar puncture, would justify the diagnosis of epidemic cerebro-spinal meningitis. Up to the present, the influenza bacillus has not been found in the

fluid obtained by lumbar puncture.

6. From Enteric Fever.

In rare cases, influenza commences with gradual pyrexia, diarrhoea and enlargement of the spleen. When this occurs the diagnosis between influenza and enteric fever is at first extremely difficult, and can only be made with certainty after the lapse of a few days when, if the case be one of influenza, the temperature will fall and convalescence set in. In such cases, too, the examination of the blood for Widal's reaction will render the diagnosis more certain.

In other cases of influenza, more especially those of the nervous type, the patient may sink into a condition of extreme prostration with fever and muttering delirium which constitutes the so-called "typhoid influenza". The sudden onset with rigors is peculiar to influenza, and so rare in enteric fever that this particular symptom is often a great help in diagnosis.

In some cases it is possible that the two diseases may occur together, or that an attack of influenza may immediately precede, and somewhat modify the course of enteric fever. The following case recently seen by the writer illustrates this point:- He was called to see a patient, a farm-bailiff aged 35, who himself stated that he was suffering from influenza. He gave the following history: He had been feeling unwell all day, and in the evening had had a severe shivering attack and had then gone to bed. When seen by the writer, about midnight, the patient complained of violent frontal headache and pains about the body and limbs. The conjunctiva was congested and there was slight coryza. The temperature was 104° F and the pulse 110. The case appeared to be typical influenza, and was treated as such. The next day the patient felt better. The temperature was 101° F, headache and pains less severe, and the tongue, although slightly furred, was moist. The coryza was more marked, and the patient complained of a severe cough. Examination of the chest revealed the presence of no abnormal physical signs. On the fourth day, the temperature became normal, and the patient said he felt quite well. On the fifth day, the temperature remained normal, coryza was much better, and the tongue clean, and the patient insisted upon getting up. The same evening the temperature rose again to 101° F and the patient again complained of a feeling of malaise and some headache, which latter, however, was not so severe as it had been. The temperature continued to rise gradually and remained between 102° F and 104° F. The tongue was very coated and flabby. The bowels, up to this, had been consti-

pated, but, on the second day after the pyrexial relapse, diarrhoea set in and became severe. Enteric fever was now suspected, and this diagnosis was made certain by the appearance, three days afterwards, or on the tenth day after original rise of temperature, of rose-spots, and by the fact that the patient's blood serum gave a positive reaction to Widal's test. Throughout the illness no definite enlargement of the spleen could be made out. The patient died a fortnight later of septic peritonitis following perforation of an enteric ulcer.

7. From Dengue.

An infectious disease which very closely resembles influenza, but which does not occur in temperate zones, is dengue. In both this disease and influenza the invasion is sudden, with pyrexia, headache, pains about the body and limbs, and severe prostration. In both there may also be insomnia, delirium, epistaxis and other haemorrhages; on the other hand, there are striking differences between them which may be tabulated thus:-

Influenza.	Dengue.
(a) Geographic distribution rapid and in all directions.	Slow, and limited to tropical zone.
(b) Absolute mortality very considerable.	Absolute mortality slight.
(c) Fever lasts 2 or 3 days.	Longer, as a rule.
(d) Neuralgic pains in limbs frequent.	Joint pains very intense.
(e) Joint inflammation rare.	Inflammatory swelling of joints not uncommon.
(f) Respiratory catarrhs common.	Never occur.
(g) Pulmonary complications, e.g., pneumonia, common.	Never occur.
(h) Severe nervous symptoms not uncommon.	Never occur.
(i) Gastric symptoms sometimes.	Very common, almost pathognomonic.
(j) Respiratory cardiac and gastric crises occur in some cases.	Never occur.
(k) Vasomotor disturbance causing macular appearance of skin sometimes occurs. Genuine eruptions are rare.	Scarlatiniform eruption on the third day of the disease, with subsequent desquammation, is pathognomonic. It is often accompanied by intense itching.
(l) Otitis frequent.	Never occurs.
(m) Many sequelae.	None.

8. From Simple Coryza and Bronchitis.

Influenza can be distinguished by the sudden onset, headache and nervous symptoms, and the extreme prostration. The sputum should also be examined for the presence of Pfeiffer's bacilli.

9. From Septic Conditions.

In rare cases of influenza there may be repeated rigors and a hectic type of temperature accompanied by drenching sweats, which may arouse the suspicion of the presence of some septic condition. Goodhart (Allbutt's System of Medicine, vol. 1., p.964.) mentions such a case in a lady who had recently undergone an operation on the uterus. She suddenly developed severe rigors accompanied by high fever, which seemed indicative of some internal source of septicaemia. The simultaneous occurrence of an epidemic of influenza, and the patient's rapid an uneventful convalescence solved the doubt.

P R O G N O S I S

PROGNOSIS OF THE ACUTE ATTACK.

Considering the enormous number of cases of influenza which have occurred, and the comparatively small number of deaths which have resulted from it, one may say that the prognosis of an uncomplicated case of influenza is good; but as in other diseases, the prognosis depends upon several factors.

Age.- In children the disease is usually of a milder type than in adults; and, as in children the effects of any malady are more readily observed than in adults, they are quickly placed under treatment,- with the result that complications are less liable to occur, and the prognosis is therefore more favourable.

Adults, on the other hand, especially those who have their own livings to earn, and who have others dependent upon them, are more likely to struggle against the disease, and to endeavour to carry on their work although suffering. The result is that they run more risk of complications ensuing which makes the prognosis less favourable. On the other hand, given a good constitution and ready submission to treatment, the prognosis is probably more favourable in adults of from 20 to 50 than in patients of any other age.

In persons above middle age, in whom the powers of resistance and recuperation are weakened, the prognosis is distinctly less favourable.

Sex.- The prognosis in females is perhaps better than in males; not that this is actually due to the sex, but for the same reasons as mentioned above; the male is usually the bread-winner of the family, and therefore more anxious to struggle against the disease.

Occupation.- The influence of occupation on prognosis is simply the influence of the occupation on the patient's constitution. Work which tends to debilitate also lowers the powers of resistance and recuperation and, in such patients, the prognosis is necessarily not so good.

Habits.- In persons of dissipated habits the prognosis is especially unfavourable, as their powers of resistance are diminished, and the tendency to complications arising is much greater. Especially is this the case with habitual drunkards, in whom a simple attack of influenza may prove fatal. In them, too, complications are much more liable to occur; the tendency to delirium tremens in drunkards suffering from influenza has already been mentioned.

Influence of Other Diseases.- The presence of certain other diseases affects the prognosis in acute influenza. Chief amongst these is pulmonary tuberculosis. The mrotality tables of all countries agree in showing a considerable rise in the mortality from pulmonary tuberculosis during influenza periods; and all observers agree that influenza has a very unfavourable effect upon pulmonary tuberculosis.

Heart disease also renders the prognosis in influenza less favourable. Patients with chronic heart disease are more liable to suffer from the cardiac crises, in one of which they may succumb.

Statistical Considerations. The most reliable statistics on a large scale as to the morbidity and mortality of influenza are those which were issued by the German War Office, (Die Grippe Epidemie im Deutchen Heere, 1889-90, Bearbeit von der Medecin Abtheil.des K.Preuss.Kreigem,Berlin,1890).

The statistics are made up from cases of influenza which occurred in the German army from the end of November, 1889, to the beginning of March, 1890. During that time there were altogether 55,263 cases under treatment: of these:-

54,805 or 99.2% were cured.
174 or .3% were disabled
60 or .1% died
224 or .4% were still under treatment when the report finishes.

The mortality was thus shown to be .1% or 1 in 1,000, which appears to be remarkably small for a disease in which the symptoms are often so severe. Complications and sequels occurred in 1,735 cases, or 3.1%.

These statistics cannot, however, be applied to civil populations, for there are considerable differences between a military and a civil population. A body of military men is composed of units which are generally above the average standard of physique and health, and who, when they do fall ill, are immediately removed from their duties and placed under proper care and treatment. A civil population, on the other hand, includes the weakly and the aged, who are specially liable to succumb to influenza, as well as many persons who, when they are attacked by the disease, cannot afford to rest or to have medical attention; therefore one would expect to find that the mortality from influenza in a civil population is considerably greater than the statistics showed it to be in the German army.

In a civil population it is obviously impossible to ascertain the exact number of persons suffering from influenza. In the year 1891 the number of deaths from influenza in England was 16,686 (Parson's Reports), which, reckoning the number of deaths as 1 in 1,000, would give the number of cases of influenza as 16,686,000; from this it would appear that the mortality in civil populations must be higher than one in a thousand.

Effect of an Epidemic Upon Vital Statistics.

An epidemic of influenza has a very unfavourable influence upon the public health - apart altogether from the deaths directly due to the disease. Thus, in four weeks of January 1890, there were 2,258 deaths above the average numbers registered in the corresponding weeks of the previous ten years. The principal diseases which caused this excess of deaths were:- bronchitis, pneumonia, phthisis, heart disease, whooping cough, and alcoholism.

Not only in the number of deaths does influenza show its influence upon the population, but it also has an influence in diminishing the number of births.

Bloch (Sém.Méd.,1891) showed that in France, the number of births in the epidemic year of 1890 was 42,500 less than in 1889. A similar influence of the disease upon the birth rate was shown to exist by Sperling (Deut.med.Woch.,1892,15) and Stumpf (Munchener med.Woch.,1893).

DISEASES OF THE RESPIRATORY SYSTEM.

In the rare laryngeal complications of influenza the prognosis is distinctly bad, as the condition may go on to ulceration and necrosis of the cartilages.

When pneumonia occurs as a complication the outlook is also grave, but a good deal depends upon the age, constitution, and previous habits of the patient. The mortality from this complication is variously estimated at from 50% to 80%.

The form of pleurisy mentioned above as sometimes complicating influenza is a very serious affection and usually terminates fatally.

DISEASES OF THE ALIMENTARY SYSTEM.

The prognosis in these affections is usually fairly good. The intestinal catarrh may in very rare cases, advance to ulceration, and when this occurs the outlook is decidedly grave.

In the three cases of parotitis complicating influenza, reported in the "British Medical Journal", July 11th., 1891, a fatal result occurred in two.

DISEASES OF THE NERVOUS SYSTEM.

Mental Affections.- The prognosis in the post-influenzal psychoses is generally fairly hopeful. As a rule, the patients, whether melancholic or maniacal, eventually recover. A certain number, however, do not recover, and the condition progresses to dementia or chronic mania.

Patients suffering from melancholia need careful attention as the suicidal impulse is often great.

The maniacal form of post-influenzal psychosis is undoubtedly the most unfavourable as regards prognosis, as it is a more advanced type of degeneration than the melancholic.

Rorie (Journal of Mental Science,1901,p. 323) states:-"Mania seems the least favourable form of post-influenzal insanity." Of 46 cases of melancholia under his care, 32 recovered, 6 were improved, 2 unimproved, and 6 died. Of his twelve cases of mania, 3 recovered, 1 inproved, 4 unimproved and 4 died. He asserts that the average period of residence in the asylum of those who recovered was about five months.

Diseases of the Brain.- In post-influenzal diseases of the brain and its membranes, such as hyperaemia, inflammation, and abscess, the prognosis is bad; such affections are generally fatal.

Diseases of the Spinal Cord.- The form of acute ascending myelitis above described, which, in rare cases, occurs as a sequel to influenza, is invariably fatal.

In the other post-influenzal diseases of the spinal cord the prognosis is more hopeful.

Diseases of the Peripheral Nerves.- Excepting those cases in which, owing to severe polyneuritis, muscular wasting has occurred and the reaction of degeneration is present, the diseases of the peripheral nerves which occur as a sequel to influenza offer a fairly hopeful prognosis. Local pareses produced by neuritis usually recover completely.

The cardiac and respiratory crises, which are undoubtedly of nervous origin, give rise to anxiety and require very careful treatment.

Post Influenzal Neuroses, such as epilepsy and chorea, are very rarely permanent, and one may reasonably hope that perfect recovery will ensue. On the other hand, an attack of influenza has been known to re-awaken epilepsy and, in such cases, the prognosis is less hopeful.

Diseases of the Eye.- Post-influenzal conjunctivitis, and the muscular pareses which sometimes occur, have a fairly good prognosis. Optic atrophy and optic neuritis following influenza are generally incurable and lead to permanent blindness.

Diseases of the Ear.- Suppurative inflammation of the middle ear as a sequel to influenza may cause considerable anxiety, and such cases must be carefully watched and surgical interference resorted to when necessary.

DISEASES OF THE CIRCULATORY SYSTEM.

The malignant form of endocarditis, occasionally met with as a sequel to influenza, is invariably fatal. In the pericarditis and the benign form of endocarditis which sometimes occur, the prognosis is more hopeful.

Post-influenzal phlebitis and thrombosis also have a bad prognosis. The condition may go on to gangrene and the patient's life be threatened.

DISEASES OF THE GENITO-URINARY SYSTEM.

Nephritis following influenza is rare. The case reported by Sympson, referred to above, recovered. The paresis of the bladder which sometimes occurs has a good prognosis.

Menstrual disorders due to influenza are usually of short duration.

TREATMENT.

PROPHYLAXIS.

Cases have been cited to prove that in some individuals, there exists a congenital immunity against influenza; but it is very doubtful if such a true immunity does exist. Some persons who have been brought into close contact with the disease throughout an epidemic, such as nurses and doctors, have remained free from it for months only to fall victims when the general epidemic was dying out.

Isolation.- The question has arisen whether persons can be protected against influenza by isolating them. Sisley (Epidemic Influenza) recommended isolation in all cases, and proposed to extend the provisions of the Infectious Diseases Act to influenza. If this were enforced during a severe epidemic of the disease, it would mean shutting up half the population; and the idea, although excellent in theory, in practice would be ridiculous.

On the other hand, the aged and infirm members of a community, and those suffering from lung affections, would derive benefit from being themselves isolated as far as possible; although strict isolation against a disease so contagious as influenza is, would be very difficult to carry out.

Hygienic Measures.- Much can be done to prevent infection by living under the best possible hygienic conditions, and avoiding all debilitating influences and the risk of catching cold.

When influenza was epidemic in France in 1890, the French Ministry of War issued the following orders,(C.de Freycinet, "A circular addressed by the Minister of War to generals commanding army corps", 1890):- "Drill in the open air is to be as short as "possible, especially in the morning. The men are "not to stand still but are to move about during the "whole time. Where expedient, drill is to take place "in closed rooms. In cold weather the men are to "wear flannel under-clothing and cloaks, and sentry "duty is to be restricted. The sentries are to be "relieved every hour, and must wear thick cloaks. If "there should be an outbreak of the epidemic, the men "are to have tea and sugar twice daily in addition "to the ordinary diet. On account of the frequent "abdominal complications of the disease, the men are "to wear flannel belts. In all barracks, rooms should "be allotted to those whose cases are slight, and for "convalescents, so as not to overcrowd the hospitals, "and such rooms must be properly warmed so as to "avoid the harmful influence of cold upon the

"respiratory organs. The surgeons are to give special "attention to any cases of respiratory affection, "however slight, more especially when occurring in "men with morbid antecedents and who are not robust; "and in the case of men with weak constitutions, the "strick rules of service may be relaxed, if thought "expedient".

By carrying out these instructions it was hoped that the number of cases in the army would be diminished. Similar orders were also issued by the Surgeon-General of the German Army.

Disinfection.- As mentioned above, the sputum from a case of influenza is teeming with Pfeiffer's bacilli; special care should, therefore, be taken to have it disinfected. It should be expectorated into vessels containing disinfectant and afterwards mixed with sawdust and burnt. Disinfection of the patient's linen and of all articles in general use should also be carried out.

Attention to the hygiene of the mouth and nose may assist in the prophylaxis of influenza, since it is by these cavities that the invasion of the bacilli takes place. Antiseptic gargles, sprays and nasal douches have been recommended. For this purpose oil of eucalyptus has probably been most used; but these methods have been carried to an absurd pitch; one writer mentions the case of a man who even went as far as rubbing oil of eucalyptus into his hair as a prophylactic against the disease! Although the use of mild antiseptic lotions for the mouth and throat can do no harm, it is open to question if the use of nasal douches may not irritate the mucous membrane and so provide a suitable nidus for the influenza bacillus to settle and multiply upon.

Therapeutic Measures.- Certain drugs have been used as prophylactics against influenza. For this purpose quinine has been in greatest demand; but it cannot be said that much positive success has been achieved by its use.

Graeser (Berlin.klin.Woch.,1889,51) experimented with quinine as a prophylactic against the disease. In one squadron of a regiment of Hussars stationed at Bonn, to each man he gave 7½ grains of quinine in half-an-ounce of whisky once daily. In this squadron only seven cases of the disease occurred, while in the other squadrons, to the men of which no quinine had been given, the number of cases varied from 19 to 42.

Tranjen (Ibid.,1897,7) states that he succeeded in arresting the spread of the disease in a batallion of infantry by the administration of quinine.

Broadbent (Practitioner,Jan.,1907) also gives evidence in favour of the prophylactic influence of quinine. He quotes the case of a large girls' school in which, during an epidemic of influenza, all the girls and mistresses took a dose of quinine every morning; but the servants were forgotten. The result was that very few of the girls or mistresses suffered from the disease, while all the servants were attacked.

On the other hand, in the military school of Glogau, in Prussia, where the cadets were systematically submitted to treatment by quinine with a view to preventing an outbreak of influenza, the number of cases that occurred in the establishment was double that of the whole garrison of Glogau. (Althaus: "Influenza",p.334).

Other experience of the method also points to the conclusion that the prophylactic action of quinine against influenza is exceedingly questionable.

Mossé (Revue de Méd.,1895,XV,3) states that he proved the immunizing action of quinine by experimenting on animals; but as Pfeiffer himself failed to produce influenza in animals, this so-called proof can hardly be accepted.

Other drugs have been advocated as prophylactics against the disease. Thus Cod-liver-oil was recommended by Ollivier (Acad.de Méd.,Feb.2,1892); Salicin by Maclagan (Brit.Med.Journal,Jan.11,1890), and Calcium sulphide by Green (Boston Med.and Surg. Journal,July,1891); but these, and other panaceas, have been rightly discarded.

TREATMENT OF THE ACUTE ATTACK.

General Hygienic Measures.- A patient suffering from influenza should be at once put to bed and kept at rest there until the temperature again becomes normal. All are agreed that mildness of attack and speedy recovery are best insured by this means.

Fresh air, and plenty of it, must be insisted upon, and from the first the sick-room must be thoroughly well ventilated. If the headache is very severe, or if there is photophobia, it is more comfortable for the patient to have the room darkened.

During the period of convalescence, there is great risk in allowing the patient to leave his bed too soon, and it a safe rule never to let a patient convalescing from influenza get up until the temperature has been normal for 48 hours.

Dietetic.- In a disease of such a depressing nature as influenza a supporting plan of treatment is necessary throughout. Plenty of light liquid nourishment must be given, and the patient's appetite tempted by varying the diet as much as possible.

In some cases, unfortunately, the anorexia present may amount to actual loathing of food, and it may be very difficult to get the patient to take any nourishment; in such cases the food given must be in the most concentrated and readily-assimilable form. Milk, junket, koumis, beef-juice and egg-custards are valuable; they should be given in small quantities, but at regular and frequent intervals.

In some patients the appetite may not be much impaired, and these may be allowed a fairly full diet, provided that the articles of which it is composed are readily digestible.

External applications, in the form of heat, are of value in relieving the aching pains which are so severe in the early stages of many cases of the disease. For this purpose hot bricks, or a bag of salt thoroughly heated, act better than the ordinary hot water bottle.

Owing to the hyperaesthesia which is a common symptom of influenza, friction with linaments is not well borne, and tends rather to aggravate the condition.

Therapeutic Measures.- Very many drugs have been vaunted as "specifics" for influenza, and it is not to be wondered at, considering that the disease is one which, in the majority of cases, tends to terminate favourably and spontaneously in a few days; so that the particular drug which was being used in the treatment of the attack was credited with the cure of the disease.

Sodium Salicylate.- In the writer's experience, this is one of the most useful drugs in the treatment of influenza. It appears to have a good effect upon the headaches and pains and to shorten the course of the disease. When the headache is very severe and is accompanied by insomnia, it is usefully combined with sodium bromide; but this plan of treatment must be carried out with caution, and it must be borne in mind that a tendency to depression is a very marked feature of the disease. In those forms of the dosease in which the heart is especially affected, the salicylates should not be used, as they themselves tend to depress the heart.

Case.- W.O., aged 26, coachman, was seized with severe rigors and intense headache and pains in the back. When seen by the writer, the next day, the patient had marked coryza, and complained of pain behind the sternum, and severe cough with slight expectoration. Temperature was 104.2°F. Pulse-rate 118. A few scattered rhonci were audible over the front of the chest. Headache and pains still very severe, and he had not slept all night. Was ordered rest in bed, milk diet, and a mixture containing sodium salicylate (gr.x), sodium bromide (gr.x) and ammonium carbonate (gr.iii) every four hours. The next day the temperature was 100°F, pulse 90. Headache present but slight, pains in body and limbs much better. Some cough still present. The bowels had not been opened, and the patient was ordered an aperient. The temperature fell to normal on the third day, and, except for slight cough, the patient said he felt quite well. He made a rapid and uneventful recovery.

Case.- A.F.K., aged 48, clerk, complained of severe headache and lumbar pains. Tongue very coated. Bowels constipated. Had had no sleep for two nights. Temperature 104.8°F, pulse 120. Ordered a purge and a mixture containing sodium salicylate (gr.xv) and sodium bromide (gr.x) every four hours. Next day the bowels were well moved, the temperature was 99°F, and the patient had passed a fairly good night. The temperature rose slightly in the evening, but fell to normal the day after; and the patient was quite free from headache and pain, and convalescence was rapid.

Case.- Mrs.H.B., confined three days. Temperature suddenly rose to 104.4°F, and she complained of severe frontal headache, photophobia, and pains all over her body. The lochia remained normal, and there was no uterine tenderness; and, as there were two cases of influenza in the house, the symptoms were attributed to this disease. The patient was ordered a mixture containing ten grains of sodium salicylate every three hours. The temperature fell in nine hours to 99.2°F and was normal in 36 hours, and the headache had quite disappeared. There was, however, very marked mental depression for some weeks after the attack, and the patient's condition bordered very closely on actual melancholia. On account of this the infant was removed from its mother's care for the time being; it exhibited no signs or symptoms of the disease. By means of careful nursing, and under tonic treatment, the patient made a good recovery, and the mental state was normal a month after the onset of the acute attack.

In these cases the rapid fall of the temperature and the early relief of the headache and pains were due, in the writer's opinion, to the use of sodium salicylate.

Antipyrin.- This is a drug which, in the hands of many observers, has given good results in the treatment of influenza. The writer has used it in a considerable number of cases, both alone and in combination with sodium salicylate, and the results have been very encouraging. Leichtenstern (Northnagel's Encyclo.) highly commends this drug and goes on to say:-"Only lack of experience, or preconceived "prejudice, can doubt that antipyrin prescribed at the "right time, in proper doses, is often of great use "for the severe neuralgias and myalgias and the general "hyperaesthesia and insomnia, both at the acme of the "disease, as well as at its onset, and often gives at "least transitory rest to the much burdened patient, "without doing him any harm."

The drug is easily soluble in water, and should be given in ten grain doses every three or four hours until relief is obtained; but the case should be carefully watched during its administration, as, in some cases, it causes marked depression. In cases where there is any cardiac weakness, it is a good plan to prescribe with it a little tincture of digitalis and tincture of nux vomica.

Phenacetin.- This drug acts in much the same way as antipyrin and its depressing effects are not so marked; but, as it is insoluble in water, it is not so conveniently administered.

Aston (Brit.Med.Jour.,Jan.23,1892) used phenacetin in many cases, and he considers it superior to antipyrin, especially for the insomnia.

Henry (Ibid.,June 13,1891) and Clemow (Ibid.,June 27,1891) also speak well of the effects of this drug in influenza.

Antifebrin has also been used, but its depressing effects are more marked than those of antipyrin and phenacetin, while its beneficial action is not so great.

Other Antipyretics.- There are many drugs now on the market which have been much praised, chiefly by their manufacturers, for their usefulness in the treatment of influenza.

Among these may be mentioned, pyrenol, migrainin, salophen, and salipyrin,- chiefly combinations of antipyrin and salicylic acid; others are pyramidon and acetyl-salicylic acid (patented in Germany under the name of aspirin). Of this list, the last mentioned is the safest and most efficacious. It may be given in ten grain doses in cachet, or in mixture combined with sodium bicarbonate. During an epidemic of influenza in a sanatorium for consumptives, the writer found this drug most useful for rapidly reducing the

temperature and relieving the severe headache and neuralgic pains.

Quinine.- This is a drug which has been extensively used in the treatment of influenza. Burney Yeo (Clinical Therapeutics, vol.II,p.702) writing of the use of this drug in the treatment of influenza says:- "It seems to be really an antitoxin in this disease." Tessier (La Grippe,Paris,1893) compares its action in this disease to that of sodium salicylate in acute rheumatism, and he regards it as the most valuable drug we possess for the treatment of influenza.

Gaillard (La Grippe,Paris,1898) expresses the same opinion, and Broadbent (Practitioner,Jan., 1907) says he has always used quinine in the treatment of influenza, and considers it to be the best remedy.

On the other hand, Eichorst (Corresp.f. Schweitz,Aerzte,5), Tranjen (Berlin.klin.Woch.,7) and Bowie (Lancet,July,1891) had no success in the use of this remedy, and Leichtenstern (Infl.Lect.1890) went so far as to say:- "the cases treated with quinine have regularly felt worse than those not so treated."

In some cases of influenza quinine is undoubtedly of great value. Especially is this so in those cases in which the depression is extreme; and also in those in whom cardiac debility contra-indicates the use of the salicylates. The frequent occurrence of otitis media as a sequel to influenza makes the use of quinine in the treatment of the acute attack not without danger.

In the writer's experience, quinine is of most value during convalescence, more especially in those cases in which neuralgic pains remain after the acute attack has passed off.

Hare (System of Practical Therapeutics,vol. II,p.192) recommends the use of salicylate of cinchonidia, which combines the advantages of the salicylates with those of quinine, without any of the disadvantages of the latter.

Salicin.- The use of this drug in influenza was advocated by Maclagan (19th. Century,Feb., 1892) and Turner (Lancet,July 21,1891). The latter administered the drug to over two hundred cases of the disease, and his results were certainly remarkable.

The drug is useful in the early stages of the disease, when it has a beneficial action on the pyrexia and the pains; but its effect is depressing, and it tends to increase the sweating which is such a common symptom of influenza.

Bicarbonate of Potassium.- Crerar (Lancet, Dec.19,1891) claimed for this drug an extraordinary influence over the disease. He considered it to be a specific when administered in half drachm doses every few hours, and he maintained that, if this treatment were universally adopted by the medical profession, influenza would be non-existent in less than a week. This opinion is not, however, shared by other observers, and, indeed, it is difficult to see upon what scientific foundation it rests.

Carbolic Acid.- This drug was recommended by Simson (Brit.Med.Journal, Jan.23,1892). He gave it in two-minim doses three times a day, and speaks highly of the results obtained.

Other drugs have been praised for their usefulness in the treatment of influenza. Thus, Long (Brit.Med.Journal, Aug.29,1891) strongly recommends Camphor; and Marotte (Bull.de l'Acad.de Med.June, 1891) speaks highly of Chloride of Ammonium.

Alcohol.- During the acute attack alcohol increases the headache, but it may be allowed to those accustomed to its use.

It is undoubtedly of great value in those cases in which there is cardiac weakness, and it is also useful where the depression is marked. It is best given in the form of dry champagne or good whisky diluted with soda-water.

In any case its use must be looked upon as medicinal, and the amount given must be regulated by the medical attendant.

Serum Therapy.- The brilliant results which have been obtained in the treatment of certain diseases, such as diphtheria and tetanus, by the administration of antitoxins, have aroused the hope that it may be possible to produce a curative serum for influenza, but, up to the present time, this has not been done; the chief obstacle to the production of such a serum is the fact that it has been found impossible hitherto to produce the disease in animals.

Hydrotherapy.- Some writers advocate the use of the Turkish and Russian bath in the treatment of influenza, but they tend to aggravate the headache and increase the fever, and they are not, therefore, to be recommended.

Sponging with warm water is useful at times, especially in those cases in which insomnia is a marked feature of the disease.

The cold bath is certainly contra-indicated owing to the cough, bronchitis, and cardiac weak-

ness so often present.

MANAGEMENT OF CONVALESCENCE.

The chief risk during this stage lies in allowing the patient to leave his bed too soon. A marked feature of influenza is the occurrence of a sub-normal temperature for some days after the acute attack has passed off, and it is during this time in which the temperature remains sub-normal and the patient's vitality is much depressed that the great liability to chill and complications arising exists. It is wise, therefore, not to allow the patient to leave his bed until the temperature has been normal for at least 48 hours, or to go outside the house for a day or two after that.

During this stage the diet must be full and nourishing, and tonic medicine will be found of the greatest value; of these, strychnine and quinine are the best and they may be very usefully combined in a mixture such as the following:-

R.

Liq.Strych.Hyd.	m.iv.
Acid.Phos.dil.	m. x.
Tinct.Quininae	m.xxx
Aq.Menth.Pip.ad	℥ i.

M. Bis die sumendus.

In this stage, also, massage, if carried out quietly and by a skilled masseur, will also do good as it tones up the muscular system and is comforting to the patient.

SYMPTOMATIC TREATMENT.

RESPIRATORY SYMPTOMS.

Coryza may be very severe and may require local treatment, especially as involvement of the sinuses is not an uncommon complication. The chief aim should be to relieve the nasal obstruction as much as possible, as the mouth-breathing consequent upon nasal obstruction tends to increase the laryngeal and bronchial irritation present. For this purpose the use of an inhalation every few hours is of value. A little menthol and oil of eucalyptus should be put into a jug of boiling water and the vapour inhaled through the nose. It stimulated a free discharge, relieves the pain a good deal, and generally "clears the head". The use of sprays and lotions for this purpose should be avoided during the acute stage, as they are apt to disseminate the infection, and there is a risk of its being carried into the middle ear.

Paraxysmal cough is best treated by sedatives, of which codeia, morphia, and the diacetic ester of morphia, known as heroin, are all valuable; the most useful of these in the treatment of this condition is heroin, which should be given in doses of 1/20th.gr. to 1/12th.gr. in tablet form or in linctus. It possesses all the advantages without any of the disadvantages of the other opium preparations.

Bronchitis.- When there are symptoms and signs indicating the presence of bronchial catarrh, the ammonia preparations are the most useful, and of these the chloride of ammonium is the best. It should be given in five-grain doses every few hours, and it is usefully combined with the carbonate of ammonium, tincture of squills, and infusion of senega.

External applications are of value in this condition. For the tight sub-sternal pain, which is such a common symptom of the early stages of the disease, the best remedy is the application of a turpentine stupe over the front of the chest every third or fourth hour.

In the later stages rubbing the chest with a mild liniament does good. In children and old people the chest should be protected by cotton wool.

ALIMENTARY SYMPTOMS.

The treatment of the symptoms which arise in the gastro-intestinal form of the disease must necessarily be "expectant". The patient's strength must be maintained by the administration of sufficient nourishment.

In this condition some writers advocate the use of intestinal antiseptics, such as bismuth, salol, and calomel; but, in the writer's experience, they are not of great value. He has found the administration of frequent small doses of morphia and hydrocyanic acid most useful for the vomiting and diarrhoea. Iced champagne is also of value, and, in the way of nourishment, koumiss and milk, aerated by means of a "sparklet" bottle, are most useful.

NERVOUS SYMPTOMS.

Headache is best treated by the administration of antipyrin and sodium salicylate, as are also the pains about the body and limbs.

For insomnia the bromides are useful, but the depressing action of these salts must be borne in mind and their effect carefully watched. Dover's powder is also of great value in relieving this condition; it should be given in a dose of ten grains just before the usual bed-time.

Mental depression, which is such a common symptom of the disease, must be treated by careful mursing, nourishing diet, and the administration of tonics such as quinine, strychnine, and iron. In some cases, alcoholic stimulants in moderate quantities may be of great value.

CIRCULATORY SYMPTOMS.

In all cases of influenza the heart must be carefully watched and any indication of weakness met by the administration of cardiac stimulants.

In those rare cases in which cardiac crises occur, strychnine, administered hypodermically, is of the greatest value. Ether and alcohol are also of use. Such cases require the most careful nursing and attention.

CUTANEOUS SYMPTOMS.

Sweating may be so profuse as to call for remedial measures; for this purpose atropine is the best drug, and it should be given hypodermically in doses of 1/150th. grain. Finkler (Twentieth Century Practice,vol.XV,p.230) mentions a case in which atropine had no effect upon the sweats, which were, however, immediately cured by the administration of salipyrin. West (Practitioner,Jan.1907) reports a case in which nitrite of amyl cured the sweats after many drugs had failed.

HYPERPYREXIA.

This condition is not excessively rare in influenza; it is most common in those cases which set in with severe cerebral symptoms and which are usually fatal. When the condition is met with it should be treated by the administration of antipyretics, such as antipyrin, phenacetin, sodium salicylate, aspirin, etc.

TREATMENT OF COMPLICATIONS AND SEQUELS.

DISEASES OF THE RESPIRATORY SYSTEM.

Sinus suppuration occurring after an attack of influenza must be treated by surgical measures.

Laryngitis requires chiefly local treatment, such as sedative sprays and inhalations.

Pneumonia.- This is the most important complication of influenza and requires very careful treatment. It must be remembered that the pneumonia which complicates influenza is of a very asthenic type, and the treatment from the outset must be directed to supporting the patient's strength as much

as possible.

Cardiac stimulation is necessary almost from the commencement of the disease, and for this purpose brandy or good whisky is the best, although, where the digestion is impaired, a good champagne will be found of most value.

Digitalis must also be given, but its vaso-constrictor action must be overcome by combining with it small doses of nitro-glycerin, so that as little work as possible be thrown upon the heart. Strychnine is also of very great value in this condition.

Oxygen has been praised in the treatment of this form of pneumonia. Brunton and Prickett (Brit.Med.Journal,Jan 23,1892) and Collier and Symonds (Lancet,Feb.27,1892) report cases in which it proved of great service.

DISEASES OF THE NERVOUS SYSTEM.

Post-influenzal Psychoses.- In these conditions the nursing is the most important factor in the treatment, and the whole aim must be to build up the patient's strength and restore the bodily and mental functions. Rest, change of scene, and avoidance of excitement are amongst the best restoratives. In some cases the formal "rest-cure" will do good, in others a sea voyage will have the desired effect, but it must be borne in mind that these cases, especially those of melancholia, require very careful watching. As the progmosis is, as a rule, favourable, these cases should only be sent to an asylum when it is absolutely necessary to do so.

The general health must be attended to. The bowels regulated and the appetite improved by the administration of bitter tonics. Insomnia, if present, should be treated with sulphonal or paraldehyd. Alcohol should not be given in these cases.

Diseases of the brain, spinal cord and nerves occurring as a sequel to influenza must be treated upon the ordinary principles used in the treatment of those diseases when occurring independently.

DISEASES OF THE CIRCULATORY SYSTEM.

The influenza toxin has a profound action upon the heart and,therefore, in all cases of the disease, special attention must be paid to the circulation. It is for this reason that some of the drugs above-mentioned, which have themselves a depressing action, must be used with care.

The actual diseases which occur must be treated on general lines, always bearing in mind that the depressed state of the patient calls for stimulating treatment.

The same may be said for the diseases of the GENITO-URINARY, CUTANEOUS, and LOCOMOTOR SYSTEMS, which sometimes occur as sequels to influenza. The chief objects must be to maintain the patient's powers in the best possible state of efficiency, and to relieve local symptoms by appropriate treatment.

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APPENDIX OF CASES.

I. SIMPLE INFLUENZA.

Case 1.- A. F.,aged 16,schoolgirl,complained of headache and pains in the thighs and limbs.Temperature 103.8°F. Pulse 110. No cough. No coryza. Tongue furred.Bowels constipated. Treated with sod.sal.(gr. x) and antipyrin (gr.viiss) every four hours. Temperature fell to normal in thirty-six hours,and headache quite disappeared. Convalescence rapid and uneventful.

Case 2.- T. B.,aged 14,schoolboy.Seized with severe rigor and profuse sweating.Complained of headache and backache.Slight coryza.No cough.Temperature 102.6° F.Pulse 140.Tongue slightly furred.Bowels open. Treated with sodii salicylas and antipyrin (āā gr.v) every four hours.On the second day the temperature fell to normal,and the convalescence of the disease was now observed.

Case 3.- F. B.,aged 45,clerk,father of T. B. Complained of severe frontal headache,pains in the back and limbs,and "cold in the head". Temperature 104° F. Pulse 106.Face flushed,conjunctivae congested,well-marked coryza present.Tongue furred,breath heavy, marked anorexia. Bowels constipated.Treated with sodium salicylate (gr.x) every three hours.Temperature fell gradually,and did not become normal until the evening of the fifth day.Headache and pains disappeared early,and the coryza soon cleared up;but the anorexia was persistent,and lasted well into convalescence,so that it was a difficult matter to get the patient to take any food.

Case 4.- M. C.,aged 11,came in from play with his school-fellows,and complained of feeling very tired, and refused his dinner.On examination,his temperature was found to be 102·F. Face very flushed,and there was slight coryza.He had suffered from measles the year previously;and,as his mother was ill with a very severe attack of influenza,his case was looked upon as one of this disease.He was therefore given a mixture containing the salicylate of soda (gr.v) every three hours. The temperature remained over 100·F.for two days,then fell to normal,and the boy made an uninterrupted recovery thenceforth.

Case 5.- G. S.,aged 28,clerk,after travelling all day was seized with severe rigor and headache. On examination,there was some coryza,and the patient complained of a hacking cough and a tightness across the chest.Physical examination revealed the presence of a few scattered rhonchi.Temperature 102.8°F.,pulse 100. Headache and pains in limbs very severe.Treated with sodium salicylate (gr.x),ammonium carbonate (gr.v),etc., every three hours. Temperature remained high for two days,and then gradually fell to normal.Headache and pains quite disappeared;but the cough was troublesome, and lasted several weeks after convalescence from the acute attack.

Case 6.- Mrs.D.,aged 64,complained of severe headache,pains in the back and limbs,running from the eyes and nose,and drenching sweats of two days' duration.Temperature 103.6°F. Pulse 94.Tongue very dry and furred,bowels constipated,coryza well marked.

When seen she also complained of sore-throat, and the fauces and throat were very congested; there was not cough, and no physical signs in the chest. Ordered a purge, and a mixture containing salicylate of sodium and bromide of potassium (ten grains of each) every four hours. The symptoms completely disappeared by the third day after treatment was commenced. The patient left her bed too soon, however, and the temperature again rose to 104°F., and the headache and pains recurred; but, under the treatment as before, the patient soon became convalescent, and made a good recovery. Although the temperature rose to 104°F., at no time was the pulse-rate over 100. In this case there was a well-marked relapse, owing to the patient's indiscretions in leaving her bed too soon.

Case 7.- W. L., aged 34, baker, complained of severe frontal headache, "cold in the head, cough, and pain in the right side of the chest. Two days before, he had felt quite well, and whilst driving his cart had been suddenly taken ill with a shivering fit and pain in the chest; then headache set in, and became so severe that he was obliged to abandon his work and go to bed. On examination, the patient's face was seen to be very flushed, the conjunctivae congested, and there was also well-marked coryza. He complained of cough and pain in the right mammary region. Palpation and percussion were normal. On auscultation, the inspiratory murmur was heard to be more harsh than normal, and the breath sounds were accompanied by a few scattered râles over the upper lobe of the right lung. Vocal resonance was

normal.The temperature was 103°F.,and the pulse 90. Respirations 30 per minute.The tongue was dry and furred,and the breath very offensive.The bowels were open. Suspicion arose of the case being one of commencing pneumonia;but the next day the temperature fell to normal,headache and pain in the chest had disappeared, and the patient looked and felt altogether better. Auscultation of the right lung still elicited the presence of some râles;there was slight cough and scanty expectoration.Examination of the sputum revealed the presence of influenza bacilli in large numbers.The temperature rose to 100°F.the same evening,fell again to normal the next day,and remained so. The cough persisted for some weeks after the acute attack had subsided;but examination of the chest,seven days after the commencement of the disease,failed to reveal the presence of any abnormal physical signs.

Case 8.- E. F. T.,aged 22,school-mistress, complained of severe headache and giddiness;the condition had arisen suddenly whilst she was performing her duties.When seen by the writer,twenty-four hours after the commencement of the attack,the patient had well-marked coryza,and complained of very severe headache, photophobia,giddiness,and "pains all over". Temperature 104°F.,pulse 120.Tongue clean. Bowels open.Under sodium salicylate and antipyrin (ten grains of each every four hours),the headache and pains disappeared,the temperature fell to normal on the fourth day after the onset,and the patient made a rapid and uneventful recovery.

Case 9.- T. S.,aged 30,clerk,whilst cycling was seized with a severe rigor,and immediately felt so

ill that he was obliged to be removed to his home in a cab.When seen by the writer,he complained of constant shivering attacks,and severe pains in the loins and limbs.Temperature was 105.2°F.,pulse 110.Examination of the chest revealed the presence of no abnormal physical ligns.The tongue was slightly furred,but moist,and the bowels were open.The patient was ordered ten grains of aspirin every four hours,and in twelve hours the temperature fell to 101°F.The patient had no sleep that night;the aspirin was then stopped,and he was ordered a mixture containing sodium salicylate (gr.x) and bromide of potassium (gr.x) every three hours.The pains became less severe,the patient passed a good night,and the following day the temperature fell to normal,and, although the convalescence was prolonged by severe prostration,the patient made a good recovery.

Case 10.- T. H. C.,aged 19,student,came to the writer complaining of headache,pains about the body,and a feeling of intense lassitude.The condition had arisen suddenly the previous evening.Temperature 103°F.,pulse 120.He was sent home to bed,and ordered a mixture containing sodium salicylate (gr.x) and antipyrin (gr.x) every four hours.The headache and pains were much improved in twenty-four hours,and,on the third day,the temperature fell to normal and convalescence set in.

GASTRO-INTESTINAL INFLUENZA.

Case 11.- H. W. B.,aged 27,tailor,was suddenly seized with vomiting and diarrhoea accompanied by intense abdominal pain.The history he gave was that,

whilst working,he was suddenly taken ill with severe abdominal pain and diarrhoea.He had three motions,which were very loose,in less than an hour;and then vomiting set in,and continued all the evening.When seen by the writer,the next day,the patient looked very ill;the face was flushed,and he was covered with a clammy sweat.The temperature was 101° F.,pulse 100.The tongue was dry and very coated,and the breath most offensive. The diarrhoea and vomiting continued;the motions were pale,liquid,and evil-smelling,and the vomited matter consisted chiefly of frothy mucus and some particles of semi-digested food.Close inquiry failed to show that the patient had ingested anything liely to cause the condition.The physical signs in connection with the chest and abdomen were negative,except that there was a certain amount of meteorism.The patient felt very "ill in himself",and was in an extremely weak state. He described the abdominal pain as being like cramp,and not localised to any particular part of the abdomen.He was ordered a mixture containing bismuth,morphia,and dilute hydrocyanic acid;and under this treatment the vomiting and diarrhoea ceased,and the tongue became cleaner.The temperature remained up for four days,but never rose above 101° F.,and,on the evening of the fifth day,became normal and remained so.The patient now complained of some headache and pains in the limbs,but these were soon relieved by antipyrin.Owing to the severe prostratiin,convalescence was slow,but the patient made a good recovery.

Case 12.- F. B.,aged 30,complained of severe vomiting and diarrhoea of some hours' duration. Had

the day before returned from a visit to his brother and sister,who were suffering from influenza.The vomitus consisted chiefly of bile and mucus;the stools were watery and extremely foul-smelling.Temperature 103° F.,pulse 100.Patient complained of great weakness and severe frontal headache,and there was absolute anorexia.Under treatment the patient's condition improved,and the vomiting ceased;but the bowels remained losse for a few days.The temperature remained about 101° F.for four days,and then fell to normal;and,except for severe prostration,the patient bec ame convalescent.

Case 13.- R. L.,aged 56,tradesman,had been eight days convalescent from a simple attack of influenza,when the temperature suddenly rose to 103° F.,and he was seized with bilious vomiting and diarrhoea. He complained of headache and severe abdominal pain. The tongue was heavily furred,and the breath very foul; the stools were copious,watery,and foul-smelling;the vomitus consisted chiefly of bile and mucus. Under treatment with bismuth,hydrocyanic acis,and morphia, his condition rapidly improved,the temperature fell to normal,and he was allowed to get up;but,in three days, the temperature again rose,and he complained of pain in the left hypochondriac region.Examination revealed the presence of a distinct hard swelling,which increas- in size,- so that,in three days,it was palpable below the level of the ribs.The swelling in question was entirely due to enlargement of the spleen.The patient was treated with frequent doses of quinine;and,under

this treatment, the temperature fell to normal, the swelling rapidly subsided, and the patient made a good recovery.

Case 14.- Mrs. J. O., aged 36, was suddenly seized with such severe abdominal pain that she had fainted. The pain continued for two hours, and then severe diarrhoea set in accompanied with vomiting. When seen by the writer, she was in a state of collapse. Temperature 97°F.; pulse very feeble; respirations very shallow; face blanched, and surface of the body cold. She complained of pain all over the abdomen, and there was a good deal of muscular rigidity and tenderness. She was ordered to bed, given brandy and strychnine, and a poultice applied over the abdomen. The temperature rose in the evening to 101°F., but the vomiting and diarrhoea ceased, and the patient felt more comfortable than hitherto. The temperature remained about 101°F. for three days, then fell to normal, and the patient made an excellent recovery.

Case 15.- L. T., aged 19, groom, was suddenly seized with severe abdominal pain accompanied by vomiting and diarrhoea. When seen by the writer, he was very collapsed. Temperature 98.2°F.; pulse 110, and very feeble. He complained of pain in the right iliac region, and there was marked tenderness in that locality. He was put to bed and given some brandy, and a turpentine stupe was applied over the painful area. The vomiting and diarrhoea ceased as suddenly as they had commenced. The temperature rose in the evening to 100°F., and fell again the next day to normal: beyond some tenderness in the right iliac region, the patient now affirmed that he felt quite well.

NERVOUS INFLUENZA.

Case 16.- T. H. L., aged 23, clerk, whilst at work was suddenly seized with severe pain in the head and giddiness. He was removed to his home; and, when seen by the writer, was lying in bed with marked retraction of the head, and compalined of violent fromtal headache, pain in the eyeballs, and very severe pain in the nape of the meck. The temperature was 102°F., and the pulse 94. Tongue clean and moist. Bowels were open; there had been no vomiting. There was marked photophobia; the pupils were normal, and they reacted to light. He had no sleep all night, and, when seen by the writer the next day, he was in a condition of acute delirium; he would not remain in bed, and acted violently towards his mother, appearing to have no idea of his surroundings, and to be unable to recognise those around him. Hyoscine (gr.1/75) was given hypodermically, and he fell asleep and slept for seven hours. When he awoke he was quite rational, but still complained of slight frontal headache. The temperature fell to normal in twenty-four hours, and the patient was up and about on the tenth day after the onset.

Case 17.- Cardiac Crisis.- K. P., aged 35, suffered for two days from influenza. Whilst raising herself in bed, she was suddenly overcome by a feeling of intense precordial distress. When seen by the writer, the patient appeared to be almost moribund. The face was very pallid, the exteemities cold, and the skin covered with a clammy sweat. The breathing was very rapid and shallow, and the pulse so rapid that it could not be

counted at the wrist.On auscultation over the apex beat, the cardiac sounds were almost inaudible.Ether and strychnine were administered hypodermically,and hot applications made to the precordia:under this treatment the patient rallied.A similar attack occurred,ten days afterwards,when the patient attempted to get out of bed.

Case 18.- Hyperpyrexia.- C. H.,aged 14, complained of headache and pains in the limbs of some hours' duration.When seen by the writer,the patient presented the typical appearance of influenza.The face was very flushed,the conjunctivae injected,and there was a good deal of coryza.Headache and photophobia were very severe.Temperature 105.8° F.Patient was ordered rest in bed,and a mixture containing five grains each of antipyrin,sodium salicylate,and sodium bromide every four hours.The same evening the temperature rose to 107°F; a cold bath was ordered,but the parents refused to allow this treatment;the mixture was stopped,and aspirin (five grains every hour)ordered; this,however,had no effect on the temperature,and the patient died that night.A post-mortem examination was refused.

INFLUENZA WITH COMPLICATIONS.

Case 19.- Mrs. C. H. B.,aged 34,had a simple attack of influenza of four days' duration.She was then seized with great pain in the left axilla,which she described as like having a knife thrust into her side, every time she breathed.Physical examination revealed the presence of a very loud pleuritic creak heard all

over the left axillary region.The temperature that evening was 100° F.;there was some cough,and very slight expectoration.The condition remained thus for some weeks;each evening the temperature rose to between 99° and 100° F.;and although the pain had quite gone, there were well-marked physical signs of thickening of the pleura,and at times the creak was still audible. The sputum was examined many times for the presence of tubercle bacilli,but none were found;and now,three months after the attack,the patient appears to be quite well and strong again.

Case 20.- Influenza with Pneumonia.- Mrs. F., aged 63,complained of headache,pains about the limbs, and severe cough of one day's duration.When seen by the writer,the patient looked very ill.The face was flushed,conjunctivae injected,and there was a good deal of coryza.Temperature was 103° F.;pulse 86;respirations 20.The patient complained of cough of a paroxysmal nature;and physical examination of the chest revealed the presence of scattered rhonchi,usually present in the bronchitis which so often accompanies influenza. Under treatment,the patient's condition rapidly improved,and the temperature was normal on the fourth day.The same evening,however,the temperature rose to 103.2° F.,and the patient complained of pain in the right side.The pulse was 120,and the respirations 36.Regarding the physical signs,- at the base of the right lung there was an area of impaired resonance,over which the respiratory sounds were harsh,and the vocal resonance slightly increased;fine crepitations could be heard at

the end of inspiration.The area of impaired resonance and harsh breathing gradually extended,so that the whole of the right lower lobe was invaded in three days.The breath sounds were never definitely tubular, but very harsh,and were now accompanied by loud râles. The temperature varied between 101° and 103°F.,and the pulse was 120 and very feeble.The inspirations were at this time 42 per minute.The patient was given a mixture containing digitalis and strychnine every three hours. The patient's condition gradually improved under this treatment,but the cough was troublesome,and the expectoration - which was at no time rusty - was copious.The temperature fell by lysis,and came down to normal on the fourteenth day of the illness.The physical signs gradually cleared up,but the patient remained in a very weak state for some weeks after the attack.
